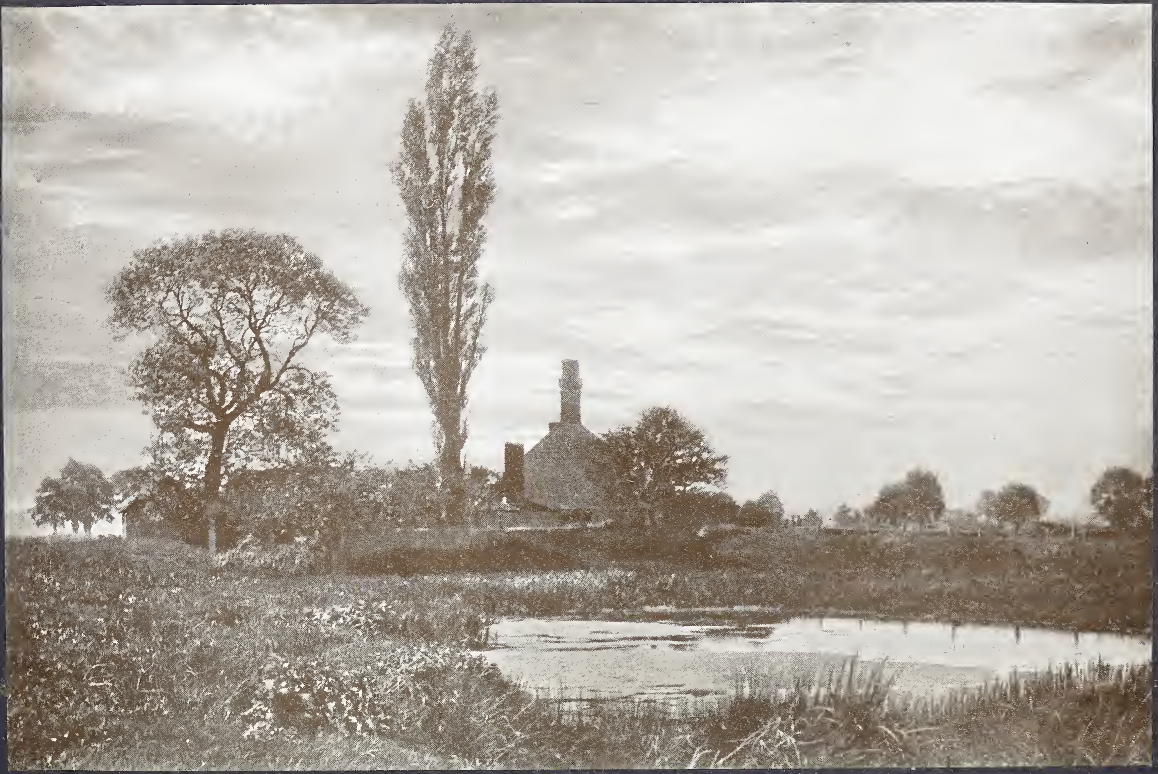

Fig. 1.
Frontispiece

PARTING DAY.

J. Gale

THE PRACTICAL PHOTOGRAPHER.

Library Series. No. 2.

The Pictorial Work of Colonel J. Gale, F.R.P.S.

By THE EDITOR.

A SCORE years ago it would not have been easy to find many pictorial photographers to whom the name of "J. Gale" was not well known as a maker of camera pictures and winner of medals. But in these days of "press the button and pay the bill" there are comparatively few who realize how much they owe to such pioneers as Gale, Robinson, Blanchard, Hill. Rejlander, Cameron, Mayland, and a few others. Yet, like the man in the play who was surprised to learn that he had been talking prose all his life, most of our present day exhibitors are unconscious imitators and followers of others who in their turn owe much these to early workers. Therefore it can hardly fail to interest the intelligent camera man to know more about any of those to whom he owes so much.

Colonel Gale was born and spent most of his early years in the country, and although professional duties have brought him for many hours of his life into London, yet he still remains a country dweller and lover. Outdoor occupations and interests have always claimed a large share of his affections, as one may readily see from a rapid glance at his work. Indeed, one might say that there is scarcely a topic or operation of the farmer's yearly routine that he could not speak about with accurate knowledge.

Hence when he shows us a hedger, or ditcher, or ploughman, we may rest assured that we have the genuine character amid harmonious surroundings, and not a dressed-up model printed in combination with a made-up background.

Young Gale's art training began at an early age, at Bedford, and was continued at the City of London School. In addition to his professional work as an architect, he has always taken an appreciative interest in the sister arts of music, poetry, and painting. It will therefore be no surprise to learn that he was sketching from nature in the early 50's. In '48, a friend initiated him into the mysteries of the Daguerreotype process,—and in '54 he was busy with a camera and the wet collodion process. A year or two later he ingeniously converted the inside of a London cab into a moveable dark-room, fitted for working 10 × 8 wet plates, the water supply coming from a cistern on the roof. Thus equipped, he was enabled to deal with landscape in an efficient manner, as these wet plates had to be developed a few seconds after the exposure had been made.

Many a strange adventure while in search of pictures might be here retold did space permit, for nothing is more enjoyable than to share in a hearty laugh while the Colonel racily recounts first one and then another amusing incident.

Those of us who, with the writer, can proudly count Gale among their friends, will not need reminding that his work, though very widely varied in subject, is yet chiefly rural or pastoral landscape with or without figures, generally the former. A fact of easy explanation when we learn that our artist has always been an appreciative admirer of the great Turner. For it is well known that this Master Painter in a large number of his works either includes human figures, or suggests human interests and occupations. Thus we find the shepherd's dog, and so infer the proximity of his owner, or we note the harrow or plough left in the corner of the field, which sets us thinking of the great laws of life and labour. Another well-known English artist, W. B. Leader, has always been a great favourite as well as personal friend, and it is

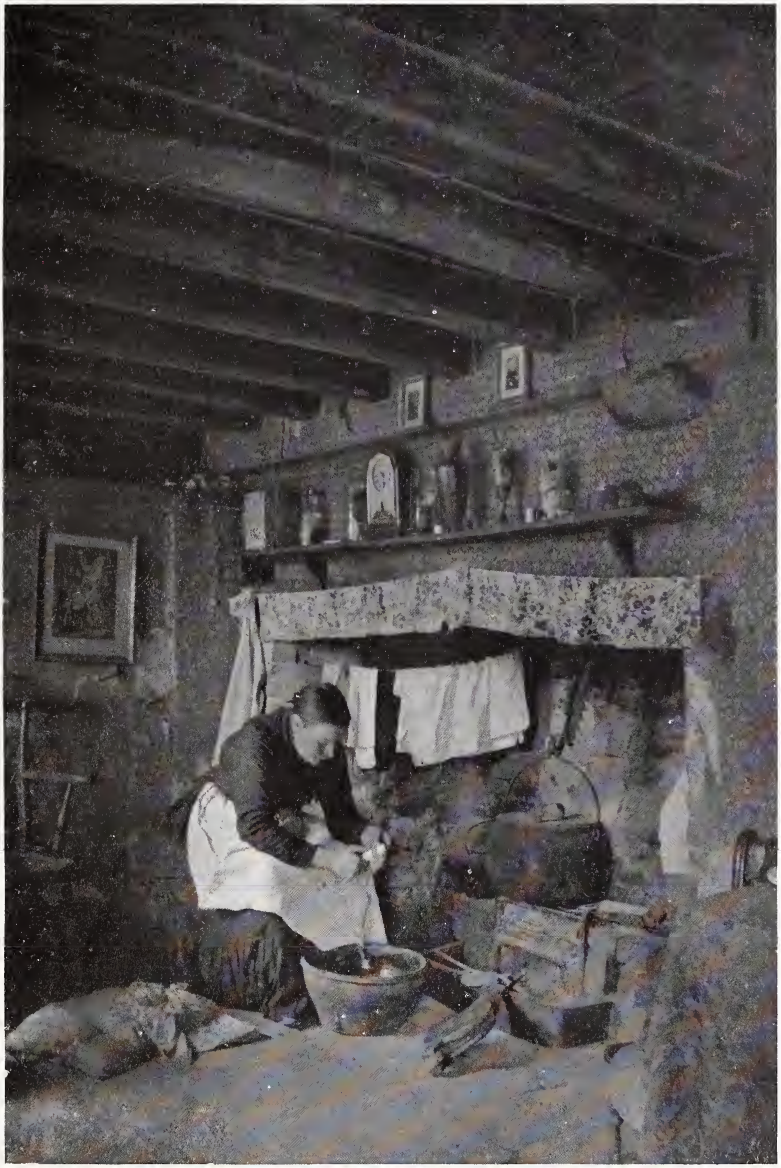

Fig. 2. J. Gale.

THE CHIMNEY CORNER.

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not difficult to trace signs of the influence of the painter on the photographer. The great art critic and writer, Ruskin, was also a considerable influence and source of inspiration.

A rapid glance at any representative collection of Colonel Gale's work at once conveys the impression that he loves the summer sun, the crisp morning air, the clear and open vista. Though at times he is tempted to deal with a misty morning or a rainy day; yet in general his pictures tell of a light and happy view of life. He is by no means blind to the inevitable limitations of photography as a picture-making process. While admitting it to be an excellent map maker and recorder of detail or incident, it does not generalize sufficiently, and tends to accentuate the literal at the expense of the poetic or imaginative side.

As regards apparatus and processes, we are not surprised to find in his long and varied experience that he has used many tools and methods, but of late years the favourite size has been a 7½ × 5¼ plate yielding, as we may see, a charming proportion for landscape work. As to printing methods, formerly the albumen-silver process, but latterly platinotype, might be reckoned as favourites. He makes no hard and fast rule as to mounting or close framing, wisely retaining freedom to use either, as the individual needs of each picture may require. Great care and neatness of manipulation always characterize his work. His uniform high technical excellence is indeed proverbial.

Now we often hear it charged against photography that it admits of no personal style, but if we had no other case to quote, the work of Colonel Gale alone would be sufficient answer and proof of the fallacy of this wrong notion.

In connection with the special technical subject of the December issue of the Practical Photographer, it is of interest to remember that Colonel Gale is also an expert maker of lantern slides. The several examples of our artist's work herewith reproduced, will all be found of special interest to the student of composition. Each one will in turn well repay careful study, and be found to convey helpful hints.

Parting Day.—In this graceful composition one seems to feel the Leader influence. The pyramidal form of the tree groups should be noted. This, to use a Ruskin phrase, is echoed by the form of the house end and distant trees to the right. A simple foreground enables us to give chief attention to the middle distance and sky. Indeed the sky perhaps claims chief attention, and suggests gorgeous colouring, "long drawn out rubies against a hill of gold." The calm surface of the water is in grateful harmony with the long cloud bands, telling of a calmly closing day.

The Chimney Corner.—An example at once showing the versatile ability of our artist. The somewhat markedly strong perspective effect is doubtless due to the small size of the room. One may profitably consider whether an omission of some of the numerous small articles above the chimney-piece would not have added force to the figure. The usual crowded condition of most cottage interiors is one of the photographer's difficulties, and calls for watchful attention.

Ploughing and Twitch Burning.—A skilful piece of landscape with figures; additionally interesting as showing the use of oxen with the plough. The composition illustrates that strength which only comes from simplicity. The foreground is again wisely subdued, and attention is thus concentrated on the figures.

Autumn: Early Morning Mist.—A complete reply to the thought that Gale's work is always sharp and clear, bright and sunny. This is a quite charming bit of impressionistic work, which is at once convincing. Note the leading lines of the composition. The old mill "half concealed yet half revealed" again speaks to us of human life and labour.

We here learn how much depends on the artistic choice of suitable atmospheric conditions.

The Lace Pillow.—

"Yon cottager who weaves at her door,
"Pillow and bobbin is all her little store;
"Content, tho' mean and cheerful, if not gay,
"Shuffling her threads about the livelong day,
"Just earns a scanty pittance.

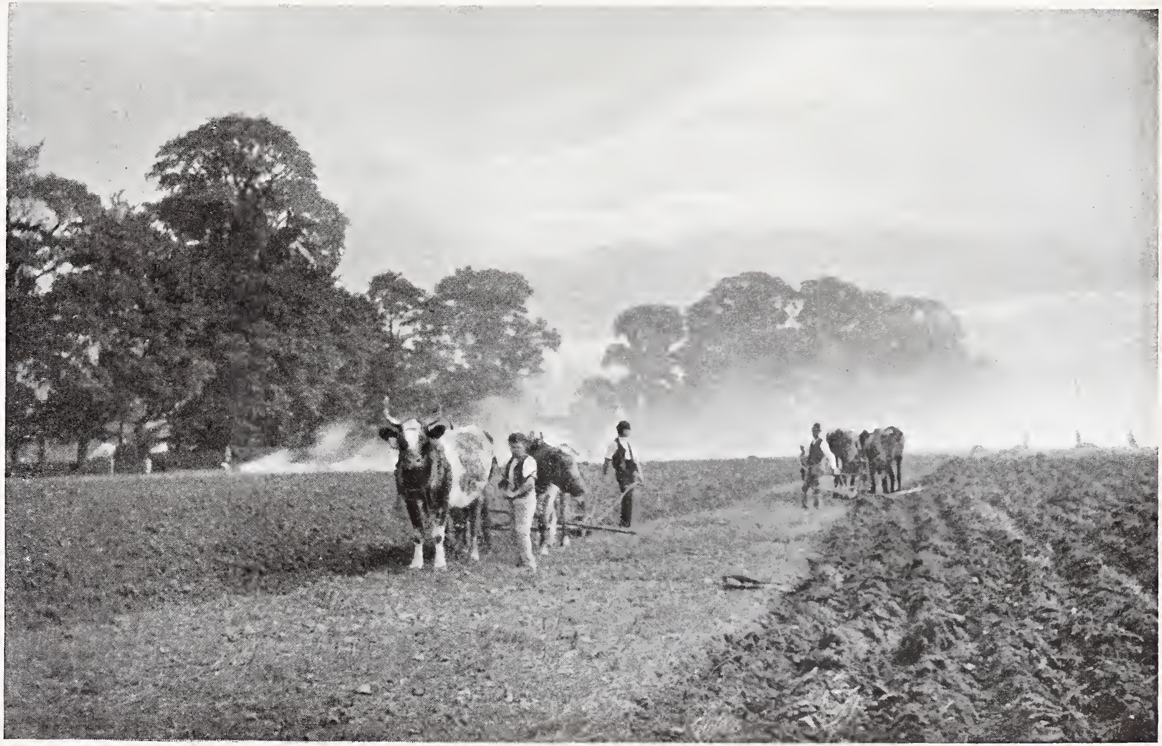


Fig. 3.

J. Gale

Ploughing and Twitch Burning.

One could hardly imagine a quotation and a picture more happily conjoined. Note the artistry of giving relief and importance to the head by the choice of the dark and quiet background doorway. The old-world cottage and flowers are all in tuneful harmony with the figure.

A Hollow of the Downs.—Once again back to the open country, sniffing the clear bright air and basking in the soft sunlight. Some may complain of the rather strongly marked diagonal arrangement of leading lines. But be that as it may, the composition as a whole carries conviction by its obviously unaffected arrangement. Let us remember that general effect is of more real importance than minor academic qualities.

A Slope of the South Downs.—To every rule an exception. To the rule of "avoid circular compositions," is this exception of a conspicuously happy result. Indeed one cannot imagine it in any other form.

In this instance our chief interest is in the nearest group of sheep, and they teach us how important is the distribution of light and shade in composition. We here attempt to show the reader some suggestions of the style of mounting, titling and signing, often adopted by our artist with very pleasing results.

Scant Pastures.—The student will hardly fail to note how much the success of this picture depends upon light and shade. He will at once see the focus of light in the sky, and its counterpart in the roadway. Perhaps one may regret the presence of some four or five sheep towards the right-hand lower corner. But who does not know the difficulty of getting sheep to go where they are wanted?

It is hoped that this most brief glance at the eight re-productions of Colonel Gale's work will serve as an invitation to return to these pictures and glean from them far more hints than space permits us to here set forth.

Practical Introduction to Bromide Enlarging.

By T. C. HEPWORTH.

MOST amateur photographers content themselves with the use of a hand camera, and most hand cameras are of quarter-plate size or even less.

Advantages. A picture which when trimmed measures something less than four inches by three inches is somewhat insignificant, and its owner will be sometimes tempted to regret that he has not invested his money in a larger instrument. But he need not repine. A large camera not only means a larger burden to carry, but it entails increased expense—larger plates, larger developing dishes, greater quantities of chemicals, larger sized paper, etc. The purchase of a large camera is not a thing to be lightly considered.

Hand Camera Pictures. Happily the man with the small hand camera can enlarge his work without much expense; while, at the same time, he will find the occupation a very pleasant one for the dark evenings, when the camera is usually put away.

Bromide Paper. The easiest way of obtaining an enlarged positive from a small negative is undoubtedly the bromide paper method. The introduction of this paper, and its sale in convenient form and at a popular price, has made what was at one time a very troublesome operation an extremely easy one, although it requires that care be taken at every stage of the process.

Support for Films. As some of my readers may confine themselves exclusively to films for their negative taking, I may at the outset explain a useful little contrivance I have adopted for holding a thin film, either the rollable

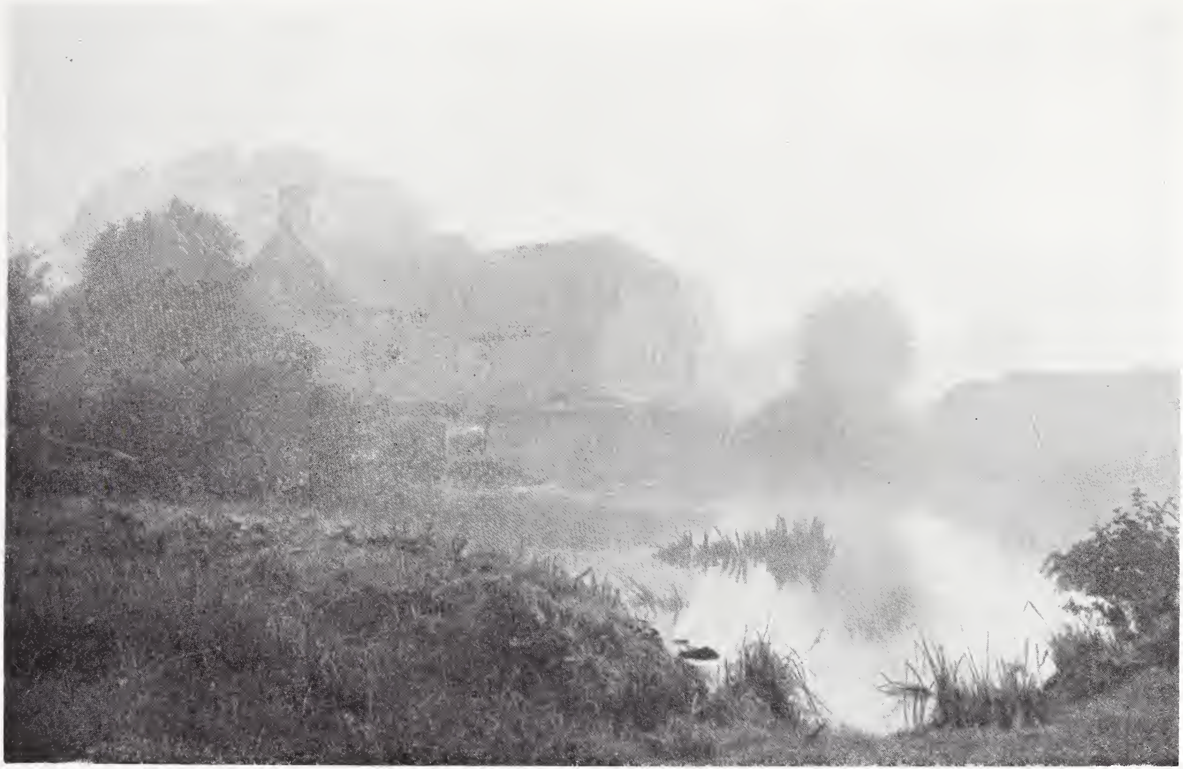


Fig. 4.

J. Gale

AUTUMN. EARLY MORNING MIST.

or flat variety, so that it can be manipulated during the enlarging process as easily as a glass plate.

Films liable to Cockle. Such a film when placed on edge in any form of enlarging apparatus, and especially in one where heat is liable to affect it, will cockle up. This is altogether prevented by securing the film between two glass plates hinged together in the way described below.

Film Holder. Select two pieces of glass the size of the film negative to be enlarged, say quarter-plate, and take good care that they are free from air-bells, scratches, or any other kind of markings. Clean them carefully and heat them on a stove or in any other convenient way. Meanwhile prepare your hinge. This is made of a piece of diachylon plaister, which you can buy at any chemist's, and should be 4¼ inches long and ¾ inch broad. Place this strip, prepared side uppermost, on the table, and press the edges of the hot glass upon it. If this work is properly done, the result will be a pair of glasses which will open in book form, between which the film to be enlarged can be slipped, and secured at the end opposite to that bearing the hinge with a small india-rubber band. If the glass be really hot when the plaister is pressed home, the latter will adhere with great tenacity.

Illumination of Negative. The first essential is that the negative to be enlarged shall be well and evenly illuminated. If we can so arrange matters that the blue sky forms a background for the negative, nothing can be better. Few windows, in town at any rate, afford a view of sky which is unimpeded by buildings, etc., and in most cases it becomes necessary to reflect the light used by means of a sloping board covered with white paper. Upon the light thus reflected into the room we depend for our enlarging operation.

Arrangement of Enlarging Room. We may regard the room devoted to the work as for the time being a camera—a camera obscura indeed—in which the only white light admitted must be reflected by the paper-covered board through the negative. This means that the whole of the window except one small aperture must be covered with some kind of opaque material. My own plan is to have a frame which fits closely to the window and is buttoned in place there. It is covered with brown paper, upon one side of which is glued black calico or silesia. In this covered calico is cut an aperture in which a frame is arranged for holding the negative to be enlarged, while in front is a shelf upon which the camera and lens are supported.

The Camera. A camera is not actually necessary in this work of enlarging, a box lid turned on edge with an aperture holding the lens answering the purpose, but I recommend a camera for the work because of the convenience of its focussing screw. If the operator decides to use a box lid in place of a camera, he must make provision for sliding it between two guide rails on its shelf, so that it can be readily focussed; and it should have some kind of support above, over which a black focussing cloth can be thrown, so as to form a kind of tunnel between lens and negative.

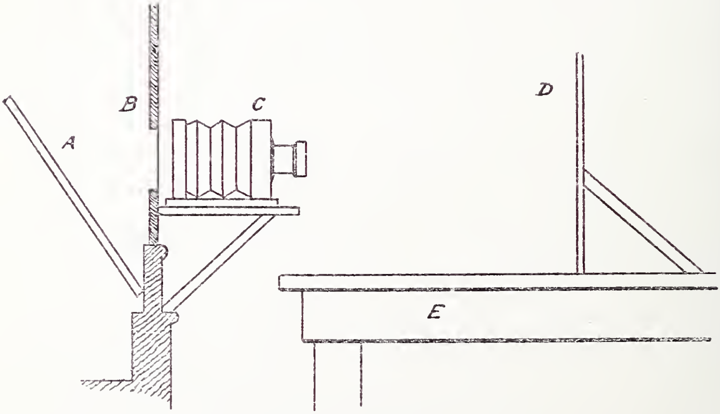


Fig. 30.

The relative positions of the apparatus required are indicated in the annexed diagram, Fig. 30, where A is the sloping board covered with white paper, which is supported outside the window and may conveniently rest on the window ledge; B, the

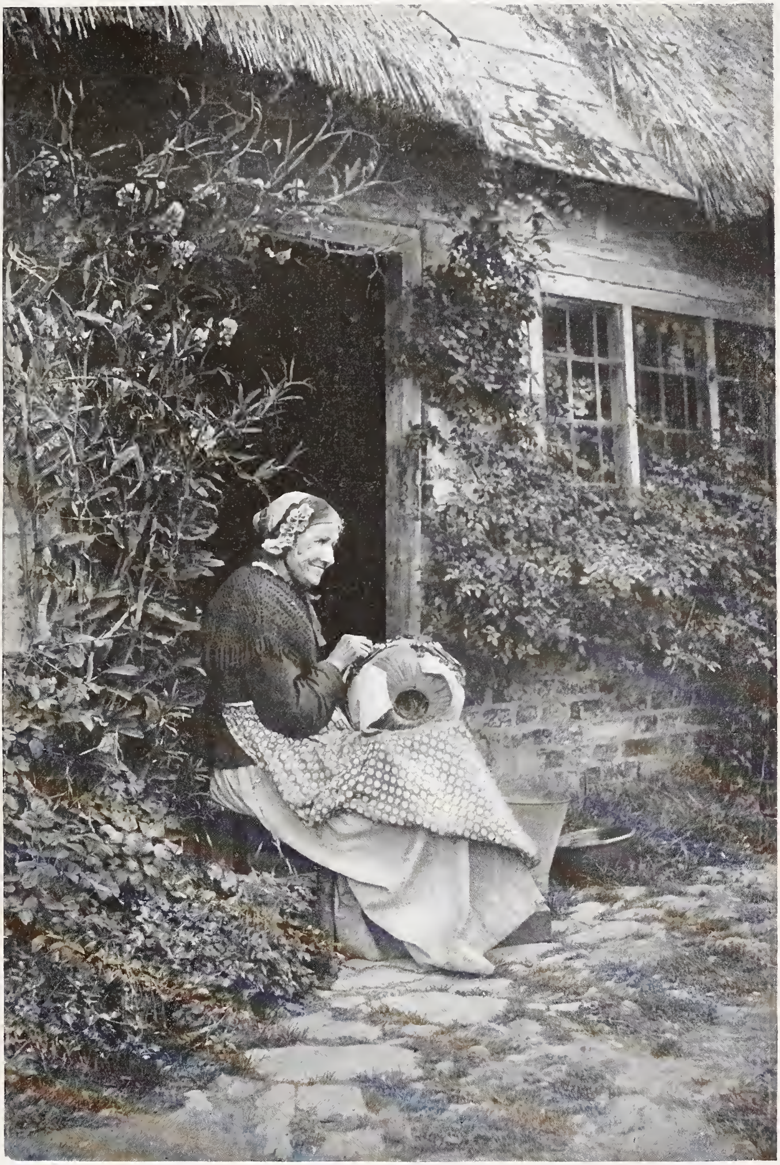


Fig. 5. **J. Gale.**

THE LACE PILLOW.

"*Yon Cottager who weaves at her own door,*
Pillow and bobbins all her little store,
Content tho' mean and cheerful if not gay,
Shuffling her threads about the livelong day,
Just earns a scanty pittance" . . . . (COWPER.

aperture in the blocked-out window holding the negative; C, the camera or, its equivalent, the box lid; D, a board supported on the table, E, to which is fixed the bromide paper during exposure.

The Screen. The board D may conveniently be permanently covered with cartridge paper, upon which the enlarged image of the negative must be focussed. By manipulating the camera screw, or by shifting the box lid holding the lens, and by regulating the distance of the screen D from the lens, the size of the required enlargement can be readily arrived at. By marking in pencil the size of the enlargement on the screen D, which will, of course, correspond with the size of the bromide paper in hand, the work of preliminary focussing is simplified. Tables showing the relative distances of lenses of varying foci from negative and focussing screen for various degrees of enlargement may be found on another page, but it is not often necessary to refer to them, so easily is the required distance found in practice.

Red Light. The lens must be kept covered, except when focussing or actually exposing the paper to its action, so that a red lamp will be needed to enable the operator to see what he is about, unless the window screen be provided with a red covered opening. An alternative plan is to use a cap for the lens with a red glass top, so that the bromide paper can be pinned in its place without any fear of white light getting to it until the cap is removed. Bromide paper being so much less sensitive than the plates or films employed for negative making, far more red or orange light is allowable in making enlargements. But it must be noted that red and orange "mediums" used as window coverings are liable to rapid fading in sunlight, and soon become unsafe to work by.

The Lens. Any good compound lens will be suitable for the work. I have used a portrait lens, a Euroscope, an old-fashioned triplet, a Rapid Rectilinear, and a Stigmatic lens among others, and can speak well of the behaviour of all. The same lens which will take a good negative will serve to enlarge that negative.

The Negative. Any negative which will yield a good P.O.P. print will also afford a good enlargement, and a negative full of detail, but so thin that it is difficult to get a satisfactory picture from it in the printing frame, will often furnish excellent results when enlarged from. An operator who makes a negative with the intention of using it for enlarging will do well to remember this, and avoid excessive density contrasts.

Exposure. It is impossible to give definite directions with regard to the exposure necessary in making an enlargement, for this will depend upon so many factors. The state of the light, the area of enlargement, and the speed of the paper must all be taken into consideration. The necessary exposure is soon arrived at by exposing a strip of paper, pinned across the focussing board, in sections, uncovering a portion for say four seconds, another for six, another for eight, and so on. When this strip is developed, it will soon be seen which section has received an exposure which gives the best results, and after it has been fixed and dried it can be kept for reference, full particulars of its evolution being plainly noted upon it. A pyro-soda developed negative will, on account of its slight yellow veil, require a longer exposure than one developed with, say Rodinal, in which the image is black and white. (Examples of trial strips are given in the chapter dealing with Exposure Factors.)

Treatment of Thin Negatives. A very thin negative, a mere ghost, can be made to yield a good enlargement by the following method. The image is bleached with mercury so that it appears as a positive when backed with black velvet. It is then photographed, so that a new negative of normal quality is obtained. This is a useful way of duplicating an unsatisfactory negative.

Supporting the Paper. We will now suppose that the reader is equipped for his first essay in Bromide enlarging by daylight, and is ready to get to work. He will require two dishes of the size of the intended enlargement. One of these will be for development and the other for fixing, and in the latter must be placed the hypo solution (strength, 4 oz. to 1 pint of warm water) and plenty of it. After the image has been focussed on the screen, and the lens again capped, a sheet of bromide paper is pinned upon the board. Special pins are made for the purpose, but ladies' toilet pins, which can be purchased at any draper's, will do the work. Care must be taken that the pins are sloped outwards, so that shadows of their round heads are not thrown by the lens on the paper.

Local Exposure. The lens is now uncapped and the estimated exposure given as indicated by the test slip. During exposure the appearance of the resulting picture can be modified by shielding part of the image, so as to give more time to parts which may be considered too dense. In special cases it is advisable to cut out a mask in black paper of a particular shape, so as to protect part of the image while another part is receiving extra exposure. In some cases it may be necessary to employ a large card with a hole in the centre by which light may be concentrated upon one particular dense spot in the picture. When this shielding is resorted to, the mask should be kept in gentle movement so as to obviate the chance of getting a hard line.

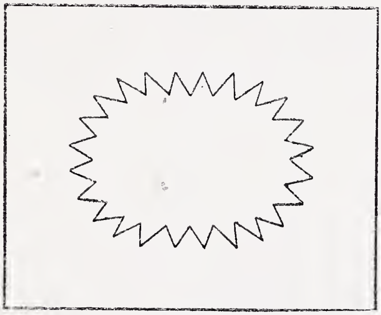


Fig. 31.

Vignetting. A picture may be vignetted by using during exposure a vandyked screen, like that shown in fig. 31. This also must be kept in constant movement in a rotary direction while the lens is uncovered, care being taken that no part of the negative which is to appear in the picture is altogether covered during exposure.

Clouds. It is not a difficult matter to print clouds into the enlargement of a landscape from another negative, but it is very easy to overdo the clouds.

In an enlargement we do not generally require any well-defined clouds, but rather a suggestion of the presence of clouds and sky.

Printing in Clouds. A convenient method of adding clouds to an enlargement is one which I have practised for some time. It requires care, but does not present any difficulties. First expose the landscape negative for the full time it ought to have, but develop partially, *i.e.*, until the image is only half revealed. Wash the print, place it once more on the easel, and while it is wet expose the cloud negative upon it, at the same time shielding the landscape portion from the action of the light. Then continue development, and if the two exposures have been properly timed, the clouds will become visible as the landscape portion of the picture acquires its full density.

Developers. As the various developers suitable for the treatment of bromide paper have already been dealt with by another pen, I need say little upon this subject. Everyone has his preferences, and I must confess that I have a fondness for the old ferrous-oxalate developer, which in my hands produces a velvety black in the shadows which I find it difficult to get by other means.

Whatever the chosen developer may be, it should be ready mixed, so that immediately after exposure the sheet of paper can be placed in the developing dish and the fluid swept over it in one even wave. Some workers prefer to give the paper a preliminary wash of water, to render it limp and more receptive of the developer, and in dealing with very large pictures this is the better way, but for prints of moderate size which are well under the control of the fingers of one hand, there is no advantage in the practice.

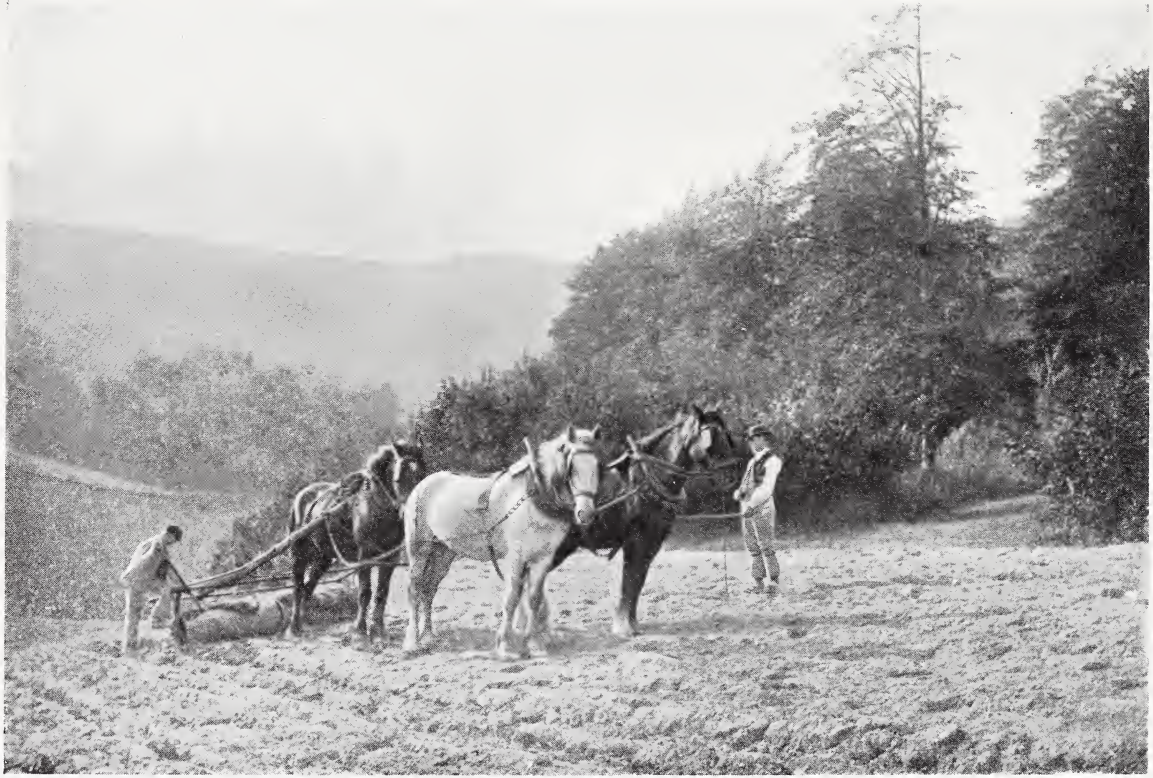


Fig. 6. J. Gale.

A HOLLOW OF THE SOUTH DOWNS

Density. Keep the developer in constant motion on the surface of the paper by rocking the dish, and watch carefully for the appearance of the image. Take care to stop a little short of what appears to be full density, for the image darkens in the fixing bath.

Fresh Hypo. The dish used for the hypo solution should be a deep one capable of holding plenty of fluid. A fresh hypo bath must be mixed for every batch of prints, and as already indicated, warm water should be used, for the dissolution of the hypo crystals quickly brings the temperature of the bath down to the normal.

Fixing. If the dish be a deep one, holding plenty of liquid, a dozen or more prints may be placed in it one after the other. Each print should be put face downwards in the bath, and gently pressed down with the fingers, and occasionally the bottom one of the series may be placed at the top. It is needless to say that every time the hypo solution is touched by the fingers, the hands must be thoroughly washed.

Washing. A convenient way of washing bromide prints is to place them in a deep dish—the one in which they have been fixed will do—and allow a gentle stream of water to run upon them for at least one hour, shifting the prints and turning them over during that time. For very large prints the household bath, with the readiness with which water can be admitted and run off, makes an admirable washing machine.

Squeegeeing By placing one of these large prints face downwards on a wetted sheet of plate glass, and squeegeeing its back, the hypo can be removed from it with great thoroughness. One or two applications of the squeegee during the washing process are highly beneficial. Small prints which can be readily handled and turned over and over do not need such attention.

The printed directions issued with the bromide paper of all makers are so explicit, that it is always well to give such printed directions a fair trial. Our remarks are intended to supplement rather than supplant the manufacturer's instructions.

Home-made Dishes. A simple tray of wood, made like a box lid and measuring, say, 20 by 16 inches, brushed over with hot gas tar inside and out, makes a developing dish which need not be despised; or we may render the tray waterproof by lining it with india-rubber cloth, which can readily be made to adhere to the wood by means of the rubber solution used by cyclists.

Uralite. I have recently made some excellent dishes of large size, using teak for the sides and uralite, a compound of asbestos which is coming into extensive use as a fireproof building material, for the bottom. A couple of coats of good oil paint have given an excellent finish to the work.

Artificial Light. For enlarging by artificial light we require the same apparatus as that already described, except that, in the absence of daylight, we must provide a means of illuminating our negative. And the negative must be lighted up evenly all over its surface. There are two methods of working open to us, one using a condenser and the other dispensing with that aid.

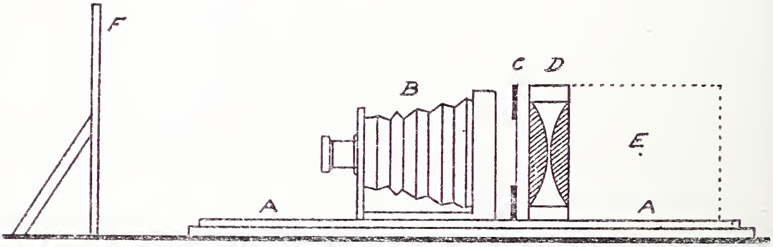


Fig. 32.

Quarter-plate Negatives. To enlarge from a quarter-plate negative the condensing lens should be six inches in diameter, and if the worker will go to the expense of purchasing one (about 30s.) he will be able to fit up the rest of the required apparatus for himself. Fig. 32 shows the relative positions of the various items comprised in the required apparatus.

Apparatus required. AA is a baseboard about seven inches in width and four feet long, to each edge of which a guide rail is affixed. Between these rails slides a little platform to which the camera B is screwed, so that its position can easily be shifted to and from the screen F upon which the enlarged image is focussed, and to which the bromide paper is pinned during exposure. C is a frame, also movable, in which the negative to be enlarged fits. D is the condenser, fitted in a square wooden frame, which also slides between the rails, and E is the light. The dotted line indicates a box which shuts in the light, and a cloth thrown over B, C and D is employed during exposure to cut off any straggling rays.

Red Window to Lantern. The box E may be provided with a red window, the light from which will be a welcome addition to that given by the ordinary red lamp for developing by.

Various Artificial Illuminants. There are many forms of artificial light which can be employed for enlarging purposes, but it must be remembered that the more nearly the illuminant approaches the condition of a radiant point when used with a condensing lens the better will be the definition given by the objective.

Mineral Oil Lamp. A triple-wick oil lamp such as is used in the cheaper forms of optical lanterns can be used for enlarging with fair results, but a sheet of finely-ground glass should be placed between the condenser and the light, for in this form of lamp a ghostly image of the flame will otherwise appear on the screen.

Acetylene. Acetylene gas is a very good light to work by, for the light given is of the right quality and the flame is comparatively small. There are many forms of convenient acetylene gas generators which have lately found favour with lanternists, and these are well adapted for enlarging purposes.

The Limelight. The best and most convenient illuminant of all for enlarging purposes is, in my opinion, the limelight. I use a cylinder of compressed oxygen, in connection with a *mixed jet*, and the hydrogen drawn from the house supply. Only so much oxygen is turned on as will give the best light, with the hydrogen at the low pressure as supplied from the gasworks, and the result is a brilliant bead of light no larger than a pea. This I regard as the ideal light for enlarging.

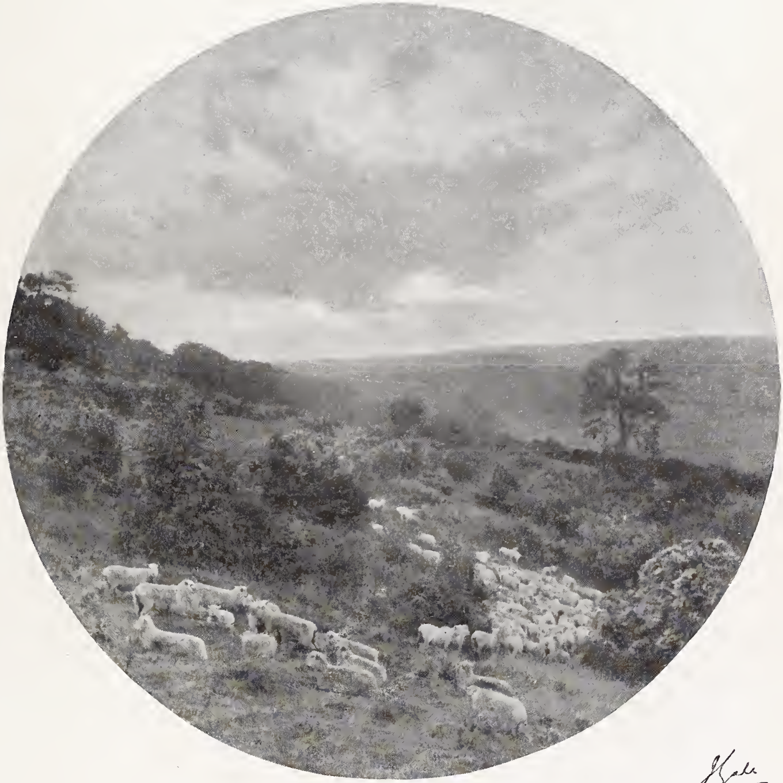
The Condenser. It must be remembered that the use of the condenser is to yield a brilliant illumination of the negative to be enlarged. A simple way of dispensing with it is to use two incandescent gas mantles side by side, with a piece of ground glass in front of them and the negative an inch away, in front of that screen. The gas lights must, of course, be shut in by some kind of box or lantern, and the quarter-plate negative should be placed with its longer diameter vertical.

Enlarged Negatives. If a number of enlarged copies are required from one original negative or if the positive enlargements are required to be on P.O.P., Platinum, Carbon, or any other of the contact printing papers, an enlarged negative must be made. This will not be found a very difficult operation to the worker who has mastered the bromide enlargement method.

An intermediate positive will be required, and it can be made in contact with, and the same size as the negative, and subsequently used in the enlarging apparatus in place of a negative, or an enlarged positive may be made at once, and a negative produced by contact from that. This is the plan which I recommend, because it is an easy matter to work with pencil on the enlarged positive, and to make good any defects.

The Intermediate Positive. The work of making this enlargement on a plate differs not at all from that necessary for bromide paper, except that the screen should be covered with black paper and the image focussed on an independent sheet of glass covered with white paper, or upon a sheet of white opal glass.

Supporting the Plate. Here is a simple, but very effective method of supporting the gelatine plate in making an enlarged negative. Upon the face of the board generally employed



On a slope of the Downs

Fig. 7.

on the enlarging easel, thin French nails are inserted as shown in Fig. 33. These nails should be about an inch and a half long, and should pierce the wood in a slanting direction for a third of their length, the two bottom ones supporting the lower edge of the plate, and the side one, by its slanting direction, preventing the plate from falling forwards. The glass plate covered with white paper, used for focussing, can easily be placed on the board between the nails, and after the image has been focussed, it can readily be replaced by the sensitive plate which is to form the enlarged negative. By adopting this plan we may be quite sure that the image will occupy exactly the same place on both surfaces. Care should be taken that the nails are placed so slantingly that their heads are not shadowed on the plate. If the board be laid flat on a table while they are being hammered in, it will be easy to fix them about a quarter of an inch out of the perpendicular, which will be all sufficient.

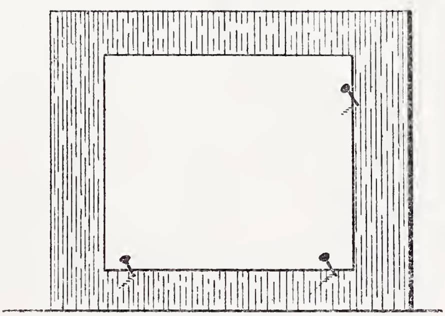


Fig. 33.

For further notes on enlarged negatives, see page 29, also page 56.

The Optics of Enlargement.

By C. WELBORNE PIPER.

ENLARGEMENT practically amounts to re-photographing the subject on a larger scale, not from the subject itself, but from a small representation of it, and the only optical conditions peculiar to the process are, first, the uniform illumination of the small image, and, second, the production of a large, well-defined image from a small near plane object. Incidentally the usual rules concerning exposure and scale are applied in a somewhat modified form.

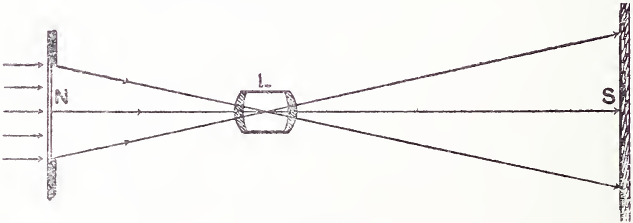


Fig. 34.

Apparatus. Fig. 34 shows in skeleton the essential components of an enlarging system. The lens L projects upon the sensitive surface S an enlarged positive image of the small negative N, which is illuminated from behind, as indicated by the arrows.

The surface S must be effectually protected from any light other than that which passes through the lens to form the image, and the lens should be also shielded from any light other than that which passes through the negative. These two essential conditions govern the arrangement of the apparatus.

If light, negative and lens are combined in a light-proof apparatus, we have an "Enlarging Lantern," which can be used in a dark-room just like an optical lantern, the sensitive surface taking the place of the lantern screen. If negative, lens and sensitive surface are combined in one large double camera, we have an "Enlarging Camera," which can be used in a light room or out in the open. Details of these and sundry other arrangements are beyond the scope of this paper, but in all cases the two essential conditions must be fulfilled.

Scale. The linear ratio of the enlargement to the negative is that of the distance S L to the distance N L. To enlarge the image R times, and also secure focus, the distance from N to L must equal the focal length of the lens *plus* the focal length divided by R, while the distance from S to L must equal the focal length multiplied by R *plus* 1. The measurements may be taken to the lens stop (a doublet being used); but as they will only give a roughly accurate adjustment, focus must be tested visually.

Diffused Daylight. The uniform illumination of the negative may be secured by employing uniformly diffused light, such as daylight from the northern sky. An enlarging camera can be tilted to about 45° and directed to the north; or, if such a camera is not available, the dark-room may be turned into a camera. The negative is then placed against an aperture in the window shutter through which light passes from outside, and lens and sensitive surface (properly protected) are inside the room. The shutter, or a portion of it, may be arranged at an angle and the rest of the apparatus tilted as before; but if this is not possible, we may keep the apparatus horizontal and use a reflector outside the window to direct the light through the aperture. This reflector should have a white surface (of paper, paint, or opal glass), be inclined vertically to an angle of about 45°, and receive uninterrupted light from the sky. Nothing but the reflector must be visible through the aperture from the position of the lens, and there should be at least six inches more of reflecting surface all round the portion so seen. Under this rule the reflector for a quarter-plate negative and six-inch lens should be about two feet square. A slight adjustment of the angle of the reflector may be necessary to render the illumination uniform.

To Test Illumination. To test the equality of this or any other method of illumination first focus the image sharply, then remove the negative and examine the patch of light projected upon the screen. If this is not perfectly even readjustment is necessary.

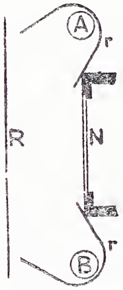


Fig. 35.

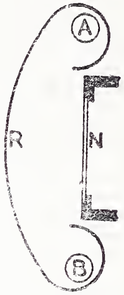


Fig. 36.

Diffused Artificial Light. There are various ways of using diffused artificial light. In Fig. 35 a white diffusing plane reflector R, placed behind the negative N, is illuminated by two equally powerful paraffin, argand, or incandescent gas burners, A and B, so placed that no light can reach the negative excepting by reflection from R. The intensity of the illumination is increased by curved reflectors *r r*, placed behind the lamps so as to throw more light on to the screen; but still greater intensity can be obtained if all three reflectors are combined into one curved reflector, as shown in Fig. 36, for with this arrangement a larger proportion of the light from the lamps finds its way to the negative and less is wasted. Success depends on the inequality of the illumination from one lamp being neutralized by the reverse inequality of that from the other, hence very careful adjustment is necessary. The reflector must have a very diffusive or "dead" surface, otherwise ground-glass screens will have to be used either behind the negative or in front of the lights, or ground-glass chimneys fitted to the lamps. Such additions reduce intensity and greatly increase exposure. With daylight less depends on the reflector, as daylight is already diffused before reaching it.

Magnesium. Strips of magnesium ribbon hung behind the negative and lighted in succession give good illumination, if ground glass is placed between negative and light and a flat reflector is placed a little way behind the ribbon. The strips should be equally spaced and not much over an inch apart, and, altogether, they should cover a space equal to the size of the negative *plus* an inch all round. The size of the light surface then ensures diffusion.

A still better method is to use strips of ribbon burnt singly and waved about behind the negative. If moved systematically so as to cover the negative with a cross hatching of lines of light the illumination will be perfectly even. Ground glass and a reflector must be placed as before.

With magnesium exposure is regulated by the number of strips used, the distance at which they are burnt from the ground glass, and the number of thicknesses of ground glass.

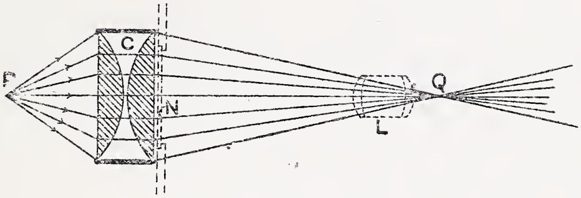


Fig. 37.

Use of Condenser. In all the above "diffused light" methods every part of the negative receives light from all directions and transmits it in all directions. Only a small portion of the transmitted light can then reach the lens, thus there is a great waste of light. This waste can be obviated by using a condenser to control the direction of the light.

In front of a small source of light, P (Fig. 37), place a condensing lens, C. Then, if the distance from P to

C is sufficient, all the light that passes through the condenser will be directed by it to an approximate point, Q. If we place the negative at N and the projecting lens at L, near Q, all the light transmitted by the negative passes through the lens. Further, with a good condenser the light will be uniform over the whole image if the cone of light emergent from the condenser just fills the back portion of the lens. The negative being placed as close to the condenser as possible, and the position of the lens being fixed by the scale of the enlargement, the light cone must be adjusted to the lens by shifting the light to or from the condenser, for the point Q always moves with P. The light must also be centred with the condenser, otherwise one side of the projected image will be darker than the other, in which case the light must be moved in a direction away from the darkness. The tests for uniformity are made under the testing conditions previously mentioned. A variation of scale may shift the lens so much as to require a readjustment of the light, but a proper adjustment cannot be made at all unless the condenser is of shorter focal length than the lens. If very much shorter it cannot be made with safety, for then the light comes so close to the condenser as to endanger it. Generally the focal length of the condenser should be from half to two-thirds that of the lens, so that a five-inch condenser is suitable for a lens of from eight to ten inch focus.

A small source of light is that of a limelight or electric arc, but condensers are often used with larger lights, such as oil, acetylene, or incandescent gas lamps. Such arrangements are not perfect, but with careful adjustment may be made very serviceable. Ground glass between condenser and negative is an effective last resource if other adjustments fail, but it greatly increases exposure.

Lenses.

The condenser is not corrected well enough, neither is the source of light small enough, to produce a perfect cone of light; further, all negatives slightly scatter or spread out the light that passes through them; hence the cone of light is never very narrow in any part, and can only be transmitted fully by a lens of large

Scant Pastures

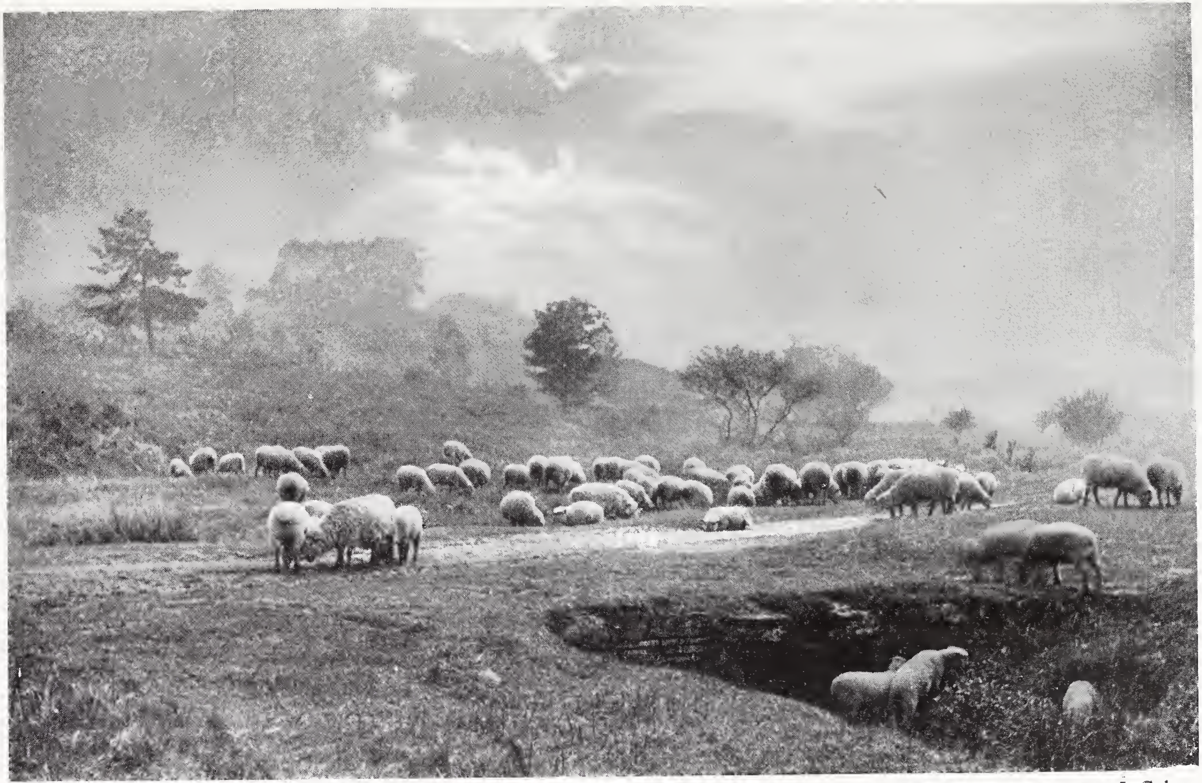


Fig. 8.

J. Gale.

diameter. Such a lens being necessary to produce the best results, portrait lenses and very rapid anastigmats are often used. We need not use large lenses with diffused light, almost any lens free from distortion being suitable. Long focus is desirable, and a well-corrected lens is to be preferred, the best of all being one specially corrected for working at near distances. Some modern anastigmats are perfect copying lenses, but an eight-inch rapid rectilinear is an excellent lens to use with diffused light for quarter-plate negatives, and a five-inch is nearly as good if stopped down. Single lenses are best avoided.

Definition. Definition does not depend solely on the lens; it is affected by the mode of illumination. A well-arranged condenser system is most advantageous, but steady daylight will give as good definition as can be generally required. Movement of the light diminishes sharpness, and the moving, intensely powerful magnesium light will give only a soft image from the sharpest negatives. This softness is, however, a very desirable quality sometimes.

Exposure. The stop generally affects exposure just as in ordinary camera work—that is to say, time varies inversely with the square of the diameter of the aperture, so that halving the diameter of the aperture quadruples the exposure; but, with a perfect condenser and large projecting lens, though this rule will hold good with small apertures, it may not do so with large ones, hence it is generally best to find the aperture that gives the best definition and use that one always. Exposure will then only vary with the scale of enlargement and density of the negative.

To compare exposures for different scales add *one* to the ratio of enlargement and square the result. Thus the relative exposures for enlargements of two and three diameters will be as the square of 2 *plus* 1 is to the square of 3 *plus* 1, or as 9 is to 16. This rule applies only to doublets; with single lenses it may give very erroneous results.

Finishing Bromide Enlargements.

By C. H. HEWITT.

PORTRAIT negatives are usually made for contact printing. The steepness of the scale of gradation is therefore arranged for the printing process employed. If thin, delicate negatives are produced suitable for P.O.P., they will also be suitable for enlarging on bromide paper.

Negatives often too strong.

But platinotype, carbon and collodio-chloride platinum-toned printing methods require negatives of greater contrast, and such negatives tend to give harder enlargements. The high-lights of such enlargements are deficient in gradation or modelling, and this deficiency must be supplied by finishing. Or, on the other hand, if the exposure and development of the enlarged print are so adjusted that the high-light detail and gradation are present, the shadows will be over-exposed and lacking in brilliancy. In the majority of cases a happy mean is hit, and a little strengthening of the shadows with, at the same time, a little work in the lighter portions is what the finisher is called upon to do.

Enlargements from Copies.

There are a proportion of inferior negatives and, of course, copies from old and faded portraits, and in the case of enlargements from such the brushwork is put in to take the place of detail which should have been there, but is not, either from the inferiority of the negative or the fading of the original. Finishing, then, is necessary to remedy the defects in the plain enlargement from whatever cause they may exist.

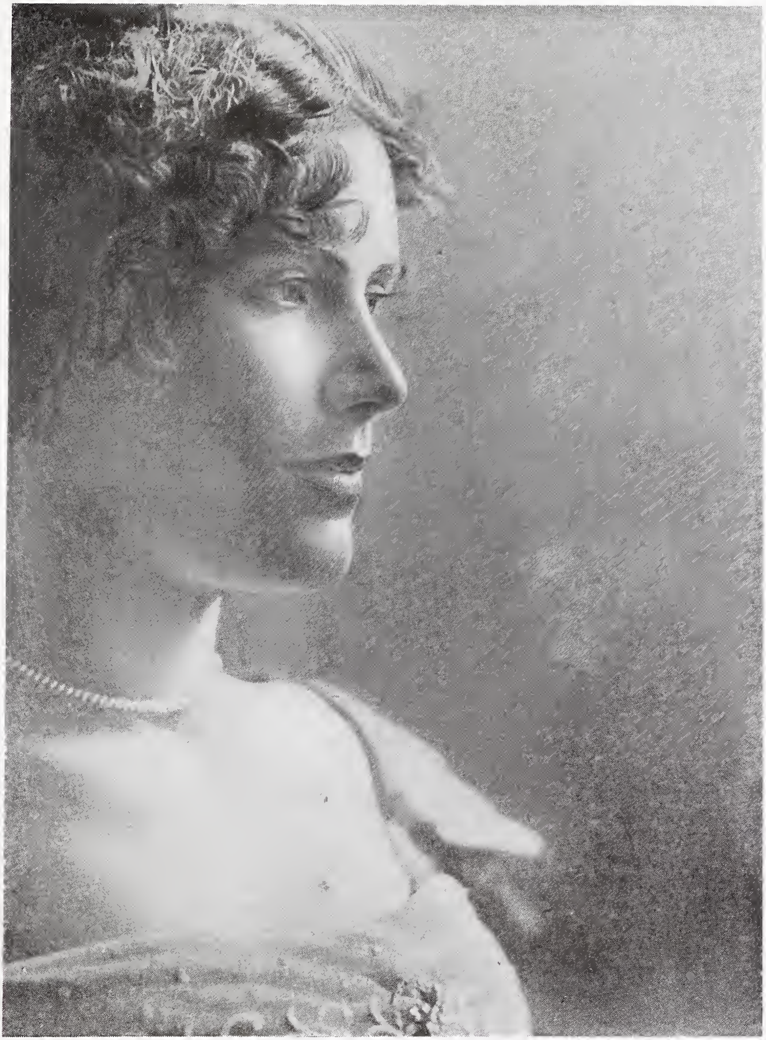


Fig. 9. C. H. Hewitt.

FINISHING: Clouded background rubbed in with Crayon Powder. Eyes and nostrils strengthened. Part of hair and face finished (p. 27).

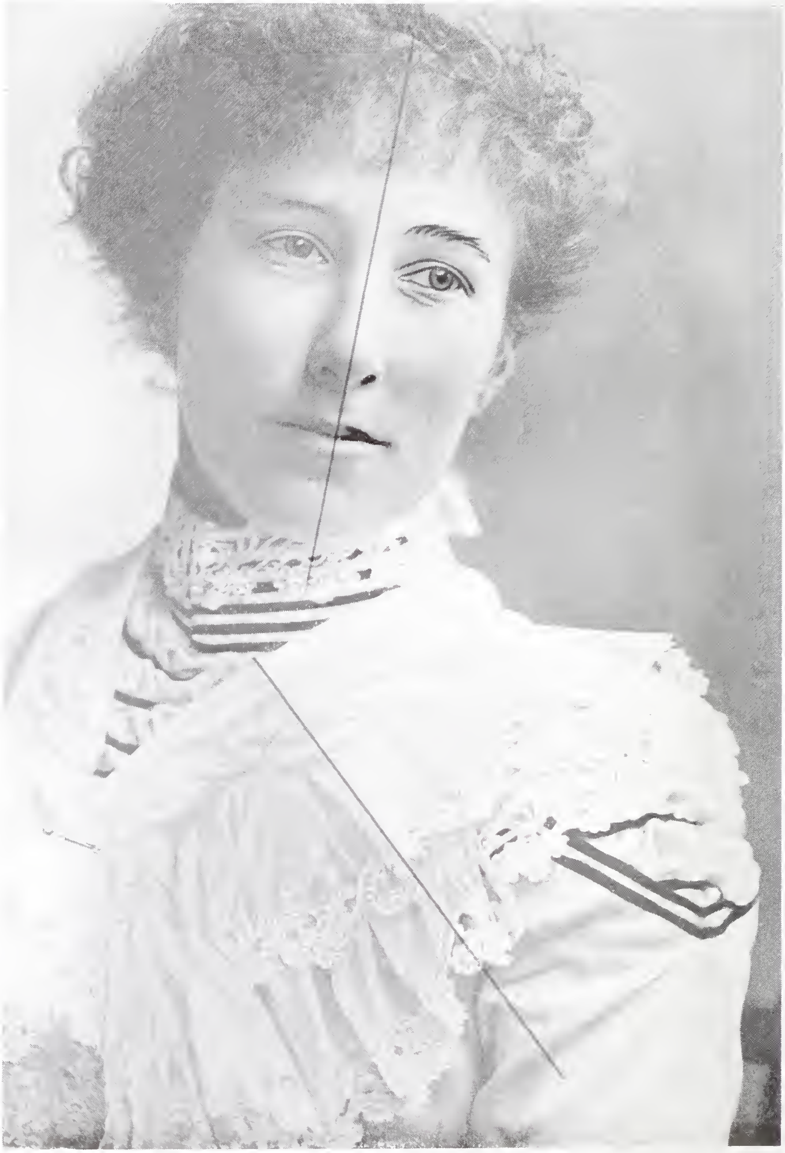


Fig. 10. C. H. Hewitt.

FINISHING: Part of drapery rubbed in with crayon powder and lights picked out with pointed rubber. Shadows strengthened too much on one side of the face (p. 27).

Materials for Finishing. Lead-pencil has been used for finishing small prints on a smooth bromide paper. Its chief drawback is the tendency to shininess wherever it has been applied. If, however, a hard pencil is employed, and very little work requires to be done, this will not be very apparent.

Crayon. With crayon there is no shine, but it is not always easy to obtain an exact match for the colour of the bromide enlargement. Crayon is useful, however, when the picture is finished by cross hatching.

Crayon Powder or "Stumping Sauce." This is finely-powdered crayon which may be applied to comparatively large surfaces by means of cotton wool, a hog-hair brush, a stump, or a pad of wash-leather.

Water Colour. The most useful form is the cake colour. For monochrome finishing Indian ink, tempered with indigo, for black prints. For sepia-toned bromides it will be necessary to use Vandyke brown or burnt umber and match the colour of the print by adding Indian ink.

Brushes. Two or three sable pencils will be necessary, and they should not be too small. When selecting care should be exercised. A brown sable is as good as a red and less expensive. Rowney's No. 6 in German silver at about 1s. 6d. and a No. 3 at 11d. will be sufficient for most work. See that the brush on being wetted and drawn over the side of the glass springs readily to a good point. Then work the point upon a piece of clean paper, and note if the hairs keep together. They should do so if the brush is a good one.

Knife and Rubber. A good knife is very useful for scraping: it should be very sharp. A surgeon's lancet is a useful tool: with it dark patches may be scraped down, and require a minimum of brush-work afterwards. The rubbers should be of two or three kinds: a piece of soft black bottle india-rubber, a piece of harder ordinary rubber, and a piece of ink-eraser which may be sharpened to a point and used for picking out lights after rubbing-in with the powdered crayon.

Powdered Pumice. Pumice powder will be found very useful for reducing large shadows which may be too black. It is applied with the ball of the finger, or with a small pad of linen rag.

How to Use the Materials. Let us imagine that we have before us a vignette bromide enlargement which is to be finished. It will be better to commence with a picture which requires only a little work. After confidence and experience are gained copies and other prints requiring more work may be attempted. We shall first get the background right. The vignette may not be quite so satisfactory as we could wish, and requires a little softening off in clouded masses. The paper will probably be slightly rough.

Rough Paper. Smooth bromide paper should never be used for enlargements requiring finishing. Lay the print, which is, of course, mounted and quite dry, flat on the table, dust a little pumice powder over it, and rub very lightly over the whole surface with the pad of linen. An old handkerchief rolled up into a ball answers well. Do not rub too hard or too long. Then dust off all the powder. This will have removed the gelatine from the top of each little irregularity of the paper surface. Next take a little of the stumping sauce; scatter it on a piece of wash-leather stretched with drawing pins or tacks on a smooth board. Roll up a bit of cotton wool to the size of a walnut, and rub it on the wash-leather: it will pick up some of the stumping sauce. To avoid putting too much on to the enlargement, and so making a black patch, rub the cotton wool first on a piece of blotting paper and note the effect.

Rubbing in the Background. Then commence on the enlargement, rubbing lightly and getting an even shading, lighter and lighter as you work away from the shoulder and face. If some of the powder gets on to the face, it does not matter: it can be removed afterwards by means of the soft india-rubber, working close to the outline of the face with the india-rubber sharpened to a point. When the clouding of the background appears satisfactory, very lightly dust off with a clean piece of cotton wool any of the crayon powder which may be loose. Now take the rubber and remove the applied powder in places so as to accentuate the cloud forms. The introduction of clouded patches may sometimes be done in just the same way with solid enlargements. Fig. 9 shows a little clouding so introduced. The background was previously perfectly even. This clouding may be done by washes of water-colour, but this is more difficult.

Treatment of Drapery, Lace, etc. Any lace or light drapery which is lacking in detail may be rubbed in with the stumping sauce in the same way, and the high-lights picked out with pointed rubber. Care must be taken not to rub in too dark. The effect is usually better than when white body colour is used for drapery high-lights. A part of the lace on Fig. 10 has been treated in this way. Drapery which is "out of tone"—that is, too light in relation to the flesh or other parts of the picture—may thus be readily put down and made much more harmonious.

Fixing the "Rubbing-in." To prevent the rubbed-in sauce from smearing, it is necessary to soften the gelatine so that it may be held on. Pour some nearly boiling water into a tin tray. Cautiously hold the enlargement face downwards so that the steam reaches it evenly, moving the print about. If the water, and consequently the steam, be too hot, the gelatine may melt, or at least appear glossy in patches. All that is necessary is that the surface of the bromide should get a little moistened; the powder then adheres to the sticky surface. Allow the print to dry, which it will do in a minute or two.

Brush-work. Now may be commenced any spotting and brush-work, and it must be borne in mind that after applying colour with the brush no more rubbing-in with powder may be done, as the powder adheres more freely to such parts. Lightly spot out any defects, resting the hand on a piece of clean white paper. Any marks where the crayon powder has been accidentally removed against the outline of the face may also be spotted in.

Stippling over the Face. Then turn the attention to the face. It will probably be found that retouching shows, and that there are a number of light little spots. The whole surface of the face may be carefully stippled in, stippling consisting of little more than fine spotting of the small irregularities. Do not get too close to the work, or the effect will be patchy.

Cross Hatching. An alternative method is that of cross hatching or shading. This may be done with the brush and colour or with a pointed crayon. Fig. 11 is a good example of a head drawn by cross hatching. Note how the lines are drawn so as to suggest the direction of the grain of the skin.

Strengthening Shadows. It will most likely be found that on examining the picture now the shadows will look weak. Sometimes when very little work is being done the principal shadows are given a wash of gum water, which slightly glazes them and increases their brilliancy. It may be necessary to strengthen them with colour also. In this case do not add too much gum: the effect of very gummy shadows is inartistic. The eyes, eyebrows, line of the lips, and nostrils will all require emphasizing a little; but it is better to do them gradually, noting the effect as you go on, than to work them too heavy and black. In Fig. 10 one eye is right; the other has been strengthened too much. Note the difference. Shadows in the hair should be put in with broad strokes. Never try to draw single hairs. See the hair over the eye in Fig. 9.

Avoid excessive Finishing. In all finishing it is necessary to know when to stop. It should always be remembered that a photograph is a representation in *tones*, and if a great deal of cross hatching in the background or on the face and drapery is done the result becomes hybrid in appearance. The less the finishing shows the better will the portrait be. The same applies to excessive glazing of the shadows, and more so still in the case of Chinese white for high-lights. Always take care not to lose the drawing. It is very easy to do so, and then the likeness is gone.

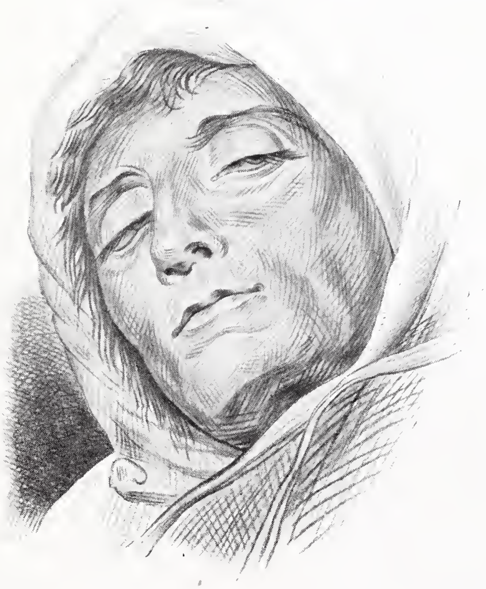


Fig. II. C. H. Hewitt.

CROSS HATCHING (p. 28).

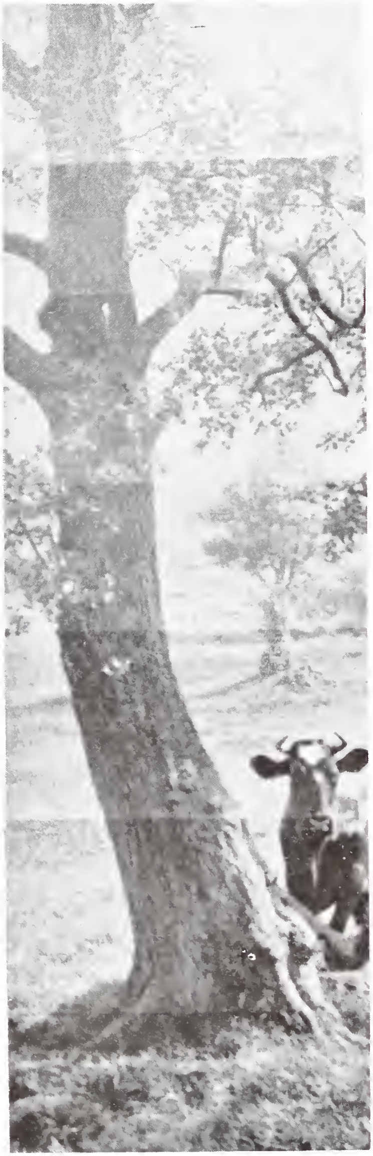


Fig. 12A.

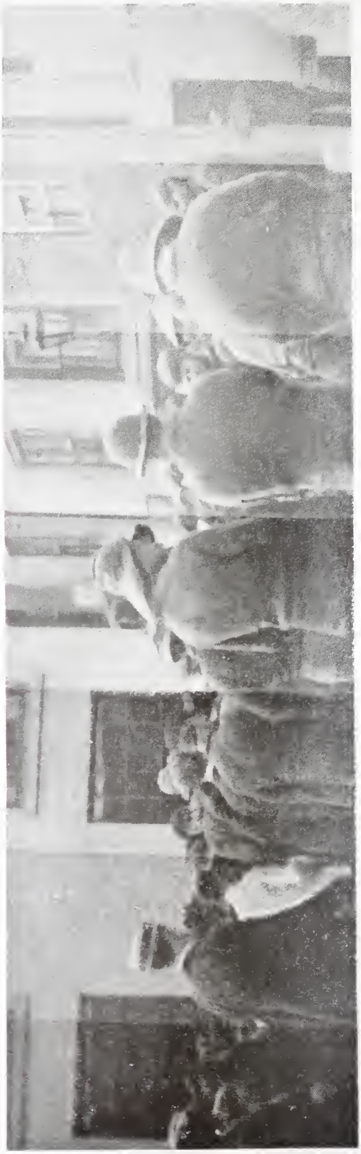


Fig. 12B.

F. C. Lambert.

EXPOSURE TRIAL STRIPS.

Enlarged Negatives.

By HENRY W. BENNETT, F.R.P.S.

IN making an enlarged negative we may assume that our object is the production of a large negative that will give a print as nearly as possible identical with the small original from which it has been reproduced. As this is the most simple aspect of the subject, it will be considered first; for, if a thorough acquaintaince with the conditions necessary for the closest possible reproduction be obtained, modifying the conditions for securing variations in the result becomes a comparatively simple matter.

Sharpness of Definition. This is easily secured if the original negative is reasonably well defined, and the elementary conditions of copying are observed. This is the most simple part of the problem of making a successful enlargement. The real difficulty, and the most frequent cause of failure to secure satisfactory quality consisting in the inherent weakness of all reproduction methods, the impossibility of accurately reproducing tone values.

Loss of Gradation. This is the weakest point in making a reproduction of a negative, whether enlarged or not. There are two stages at which the loss of quality may arise, the intermediate transparency and the new negative, the utmost care should be devoted to reproducing the gradations of the original as closely as possible. The worker who can accomplish this most successfully will be best qualified to modify the original gradations if circumstances require it, but making such departures requires skill, and is difficult to accomplish satisfactorily.

Contrast. Greater or less contrast than exists in the original negative is not considered as a departure from the original gradations, it is simply the reproduction of the same character on an extended or compressed scale, and presents no special difficulty.

The loss of gradation previously mentioned consists essentially in a weakening of the details at each end of the scale, the shadows and high-lights. This can be readily appreciated when the weakness of shadow detail or light gradations in an ordinary negative is compared with the strength of the gradations in the subject on which the plate was exposed. A corresponding loss in reproducing becomes, in some cases, very serious, and the utmost care should be devoted to minimising it, and retaining the value of the original as far as the process will allow.

The Original Negative. This is an important factor in obtaining a satisfactory enlargement. That it should be sharply defined throughout scarcely needs stating, since any want of sharpness becomes magnified and more apparent when enlarged, and in the important matter of gradation it should be such that a slight loss can be afforded without being too apparent in the reproduction. While, in the majority of cases, it should be very fully exposed—verging on over-exposure—so as to secure the maximum quality of shadow detail, and so assure the enlargement against the appearance of under-exposure, yet this is not an invariable rule. In a subject that depends for its quality on the rendering of the lighter portions, a grouping of white flowers or a figure study with light draperies for example, these light gradations must be well pronounced in the original, a condition inconsistent with very full exposure, as it is in this portion of the scale that the greatest loss will occur.

The Transparency May be made by the carbon process or on an ordinary gelatino-bromide plate. Although many prefer the former, the latter is in most respects far preferable. Amongst other advantages, it offers far greater facilities for modifying the degree of contrast or such other variations as may be desired, and while the conditions remain identical, three or four transparencies may be made from one original and the exact quality required more easily secured than could be done if the repetition were made under changed conditions.

The Plate. A slow, clean-working plate should be selected. One that gives density easily, not because great density in the transparency is desirable, but because a plate of this character will allow the greatest control to be exercised in the production of the transparency. Freedom from fogging or veiling, other than that due to the exposure, is more important in this than in ordinary negative work, in order that the utmost may be gained from the thinnest parts of the image.

The transparency should be made in the camera for sizes larger than quarter-plate, and even in small sizes, camera copying will be frequently desirable. Where contact can be assured between the transparency plate and the negative throughout their entire surface, contact printing may be adopted.

For camera copying, the simple apparatus shown in the subjoined Fig. 38 will facilitate working, and it will be found useful for so many purposes in amateur photography—still life, ordinary copying, etc.—that no one whose work includes enlarging, lantern-slide making, or anything that would be done on his ordinary work-room table, would ever attempt to work without it after having experienced the advantages and simplicity of working that it confers. It consists essentially of two guides, A A, connected by cross pieces forming the base. A flat board, B, is fitted with projecting pieces in its under side so that it shall slide truly on AA, and on the top there is a raised piece, C, exactly at a right angle to A A, against which the front of the camera baseboard fits when it is attached to B by the tripod screw, the hole shown being carefully spaced so that the camera can take no other position. The attachment shown at the far end consists of a frame, D, having an opening the size of the largest negative that will be used, carriers being fitted for smaller sizes when necessary, This frame is hinged to a board, E, which slides on A A in a similar manner to B, D being kept perpendicular to E by a strut at each side, and folded for storage when not

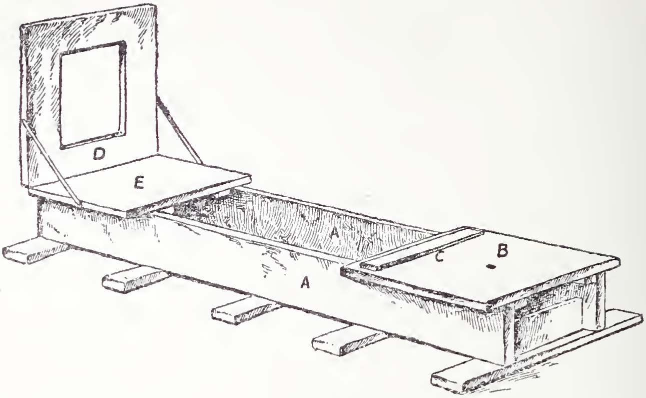


Fig. 38.

in use. It is essential that the frame D and the camera back should be absolutely parallel.

The apparatus is directed towards a window which should be screened by a piece of ground glass considerably larger than the opening in the frame, the camera attached to the sliding board B, and extended as nearly as possible to the correct degree, and placed approximately at the proper distance from the frame D.

Lens Distances. If the focus of the lens is known, the distance from the negative to the lens and from the lens to the sensitive plate can be easily calculated. The greater of the two distances will be the focus of the lens multiplied by the degree of enlargement or reduction and the focus of the lens added to the result; the smaller distance will be the greater divided by the degree of enlargement or reduction. If an enlarged copy is being made, the greater distance will be that from the lens to the sensitive plate; for a reduced copy this will be the smaller distance. As an example, to make an enlargement of three times linear with a nine-inch lens the distance from the sensitive plate to the lens will be thirty-six inches, and the distance from the original to the lens twelve inches. For reproducing the same size, both distances are equal, each being twice the focus of the lens.

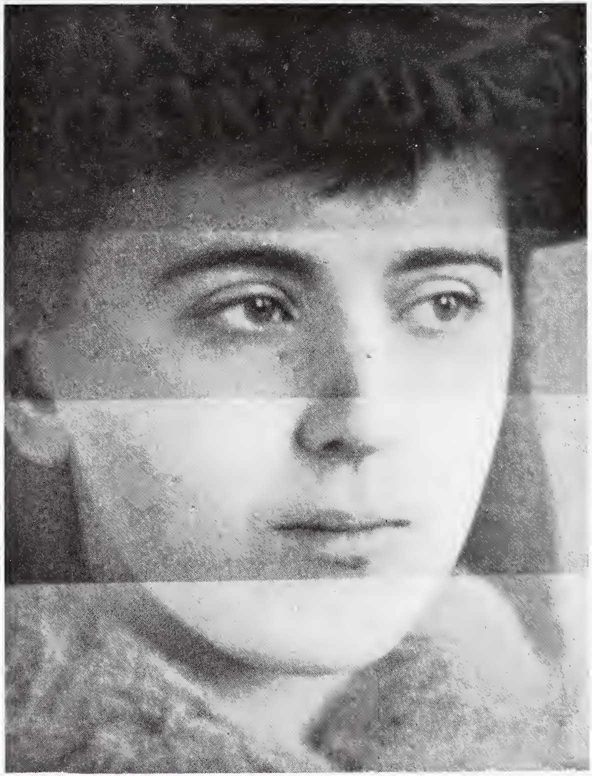


Fig. 13.

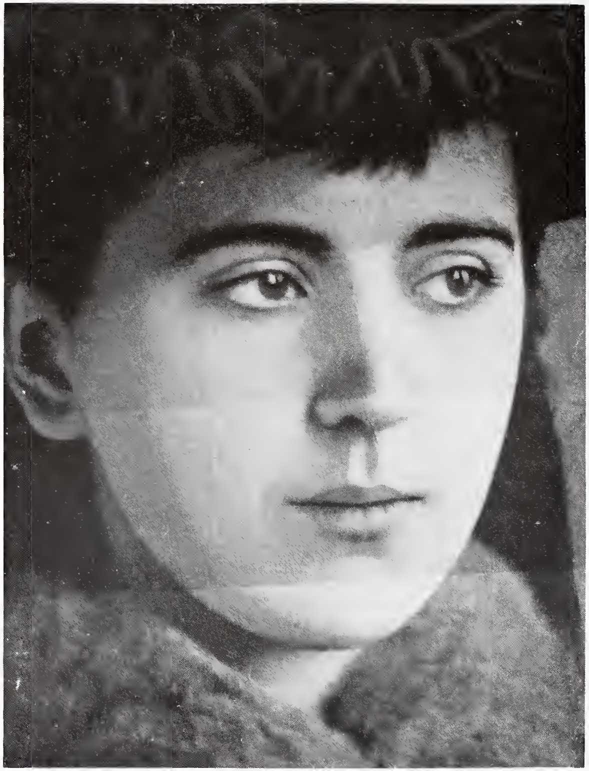


Fig. 14.

TRIAL EXPOSURES.

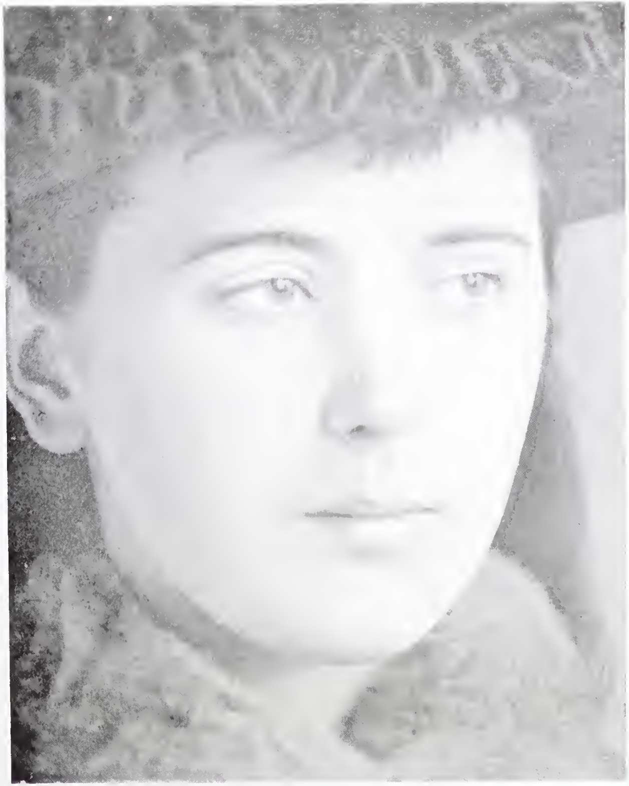


Fig. 15.

UNDER-DEVELOPMENT.

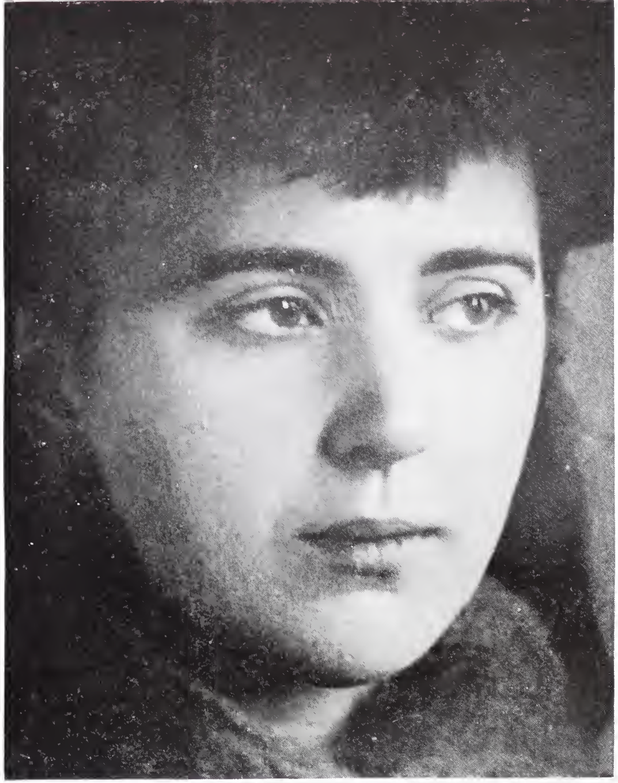


Fig. 16.

OVER-DEVELOPMENT.

Same Exposure.

The transparency should not be smaller than the original negative. Although most workers will probably prefer to make it the same size, it may be an advantage to make an enlarged transparency when working from small sizes or enlarging many diameters. In the latter case it will obviate the necessity of an excessive degree of enlargement from the transparency, and as all slight defects,—pin-holes, spots, etc,—are magnified, this will be a decided gain.

The apparatus being erected as described, the negative to be reproduced is placed in the frame D, the film side towards the lens, both sides having been carefully dusted, and the image focussed on the screen. If the reproduction is the same size as the original, or the enlargement or reduction only slight, it will be useless to attempt to focus by racking the camera front in or out, as there is such a wide range of camera extension without appreciable loss of sharpness, though the variation in size of image is considerable. The camera being set to the correct extension, focussing is performed by sliding it backwards or forwards until the best definition is secured, and if it is found that the size of the image is correct, the exact extension should be noted, and the camera can be readily set at any future time.

The space between the frame holding the negative and the camera should be covered to exclude as much extraneous light as possible. It is not necessary that it should be light-tight, but a strong light in front of the lens will not only prevent full contrast being obtained in the transparency, but it will seriously interfere with the gradation. It will be sufficient to put two laths from the corners of the frame D to the camera, and cover the whole with a focussing cloth, taking care that it fits closely to the frame, but does not obstruct any portion of the negative. This should be done after focussing and adjusting the diaphragm.

Exposing. The exposure should be made by removing and replacing a sheet of card that entirely covers the frame holding the negative. It is impossible to give any rule for determining its duration, since so much depends on the density of the negative and the type of transparency required. Using an ordinary plate, speed about 40 H. & D., and F 16 in the best possible light, it may vary from two seconds to one minute, or with a transparency or process plate, eight times as long.

The Character of a Transparency for Enlarging. This is different from that of a lantern slide, or one intended for decoration. Such an exposure must be given that the lightest portions are fully exposed, and every part shows a strongly marked image on development. In those subjects where the extreme high-lights are small points of intense light and are very dense compared to the remainder of the negative, they may be clear glass in the transparency, but for all ordinary subjects no portion should be free from deposit. The density of the shadows should be greater than for a lantern slide, the strength being similar to that of a negative that would give a good, rich print on ordinary gelatine printing-out paper.

The greatest care should be devoted to securing a suitable transparency in which the gradations of the original are reproduced as satisfactorily as possible; if this is secured, the remaining work is comparatively simple and certain.

Clouds. The addition of clouds to a landscape should be made by preparing a separate transparency, on which the desired clouds are printed with suitable masking. They should be rather stronger than desired in the final negative, as it is in this portion of the scale that the greatest loss of gradation will occur. The two transparencies should be bound together with lantern slide binding, the cloud transparency having been so made that the clouds shall be in the correct position when the two plates are attached, the glass side of one to the film of the other. Should it be found that the clouds over-lap the landscape, the hypo and ferricyanide reducer should be used to tone down or remove that which is not wanted.

The transparency should be carefully spotted or retouched to remove all mechanical defects before

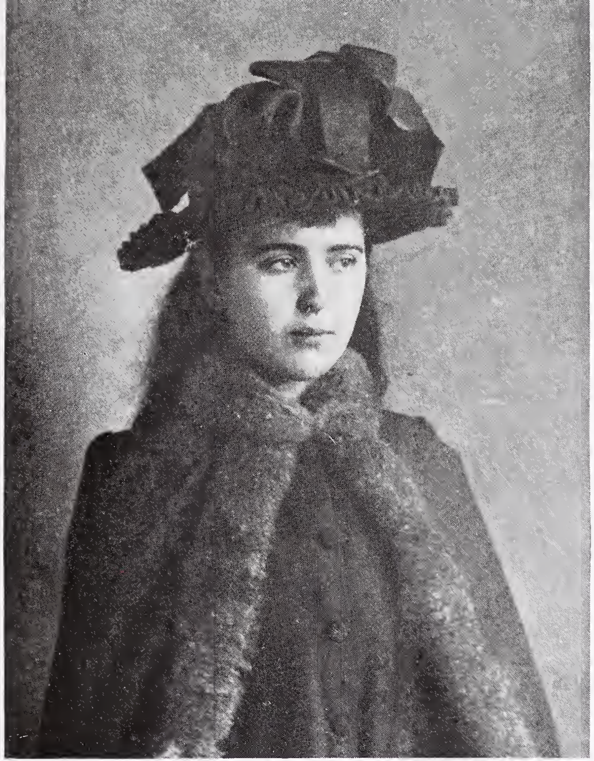


Fig. 17.

CONTACT PRINT.

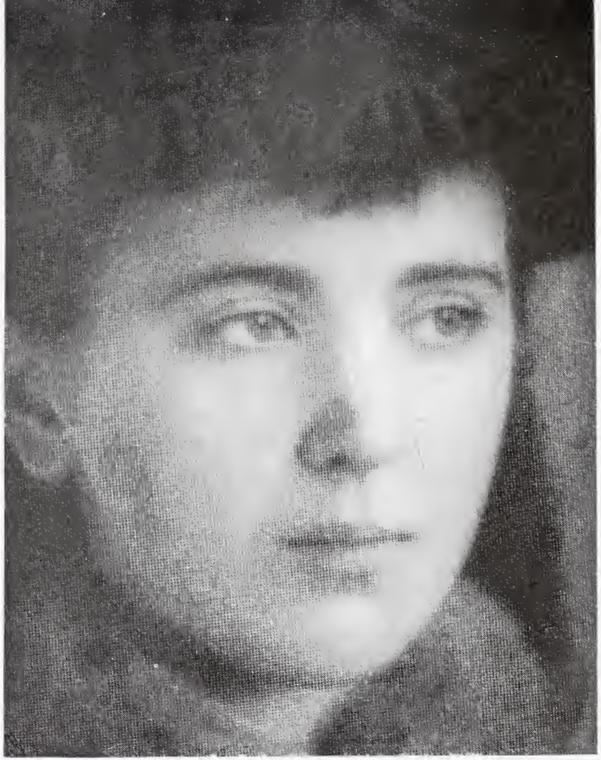


Fig. 18.

ENLARGED UNDER BOLTING CLOTH (p. 48).

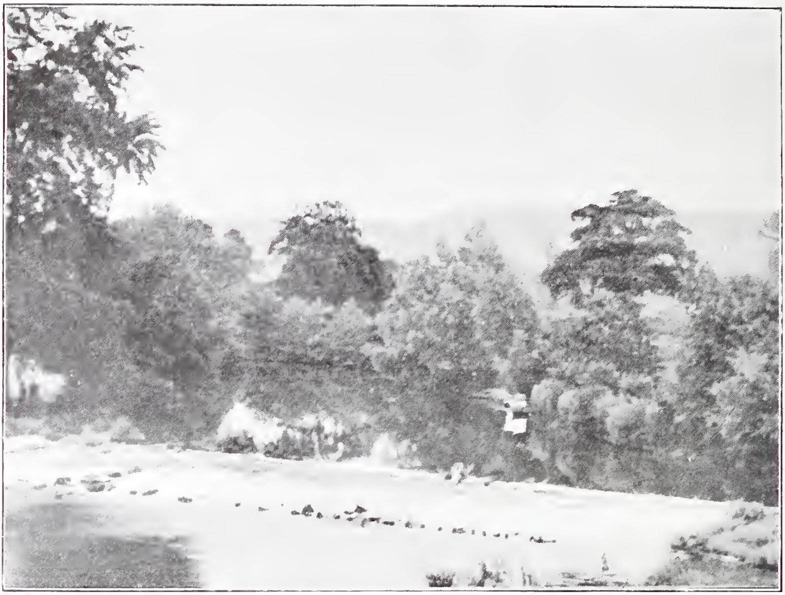


Fig. 19.

ORDINARY ENLARGEMENT.

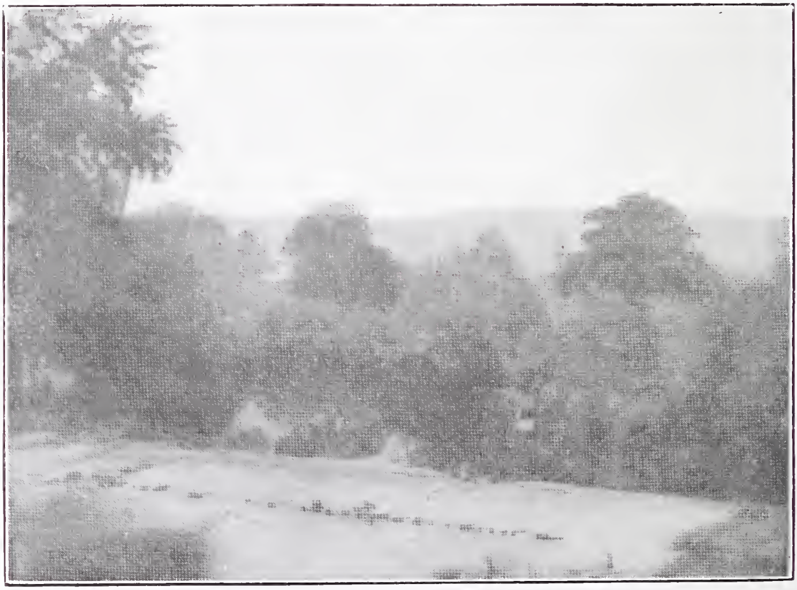


Fig. 20.

THE ABOVE, BUT ENLARGED UNDER BOLTING CLOTH (p. 48).

the enlarged reproduction is made, and dusted on both sides before being placed in the holder.

The Enlarged Negative. For making the enlarged negative, either an enlarging camera may be used, or the work room may become the camera by covering the window with opaque material, and excluding light from all other sources. In the former case the procedure will be exactly the same as that given for making the transparency, the enlarging camera being attached to the sliding board B, the extension and distance from the frame D being ascertained by the method previously given. For ordinary work, the transparency should be inserted in the frame with its film side towards the lens. If a reversed negative is required for single transfer carbon printing, the glass side of the transparency should be towards the lens. In either case, if a compound transparency is used, the landscape or principal portion should be nearer the lens, the clouds being outside. The image that is taken through the film of the other suffers slightly from diffusion, and this will be scarcely noticeable in the clouds, but objectionable if the definition of the landscape were less crisp than that of the sky.

After focussing with a large aperture, the diaphragm of the lens should be reduced sufficiently to cover the plate with uniform sharpness.

The Lens for making the Enlargement. This need not be one capable of covering the large plate under normal conditions, as the camera extension is so much greater than the normal focus. The lens with which the original negative was made will answer as well as any, but it is very necessary to pay special attention to securing uniform definition over the large plate in work of this character.

If an enlarging camera, which may be very simple in construction, is not available, the arrangement shown in Fig. 39 will make an efficient substitute. The sliding stand AA, previously described, is placed on the work table at right angles to the window and almost touching it. At the farther end from the window a board, B, to hold the sensitive plate is attached in a similar manner to the frame for holding the transparency, sliding for modifying the degree of enlargement and for rough focussing. If desired the transparency frame may be used by clamping a small drawing board to it. The camera is attached to the stand at the end near the window, and raised so that its centre is approximately opposite to the centre of the board B.

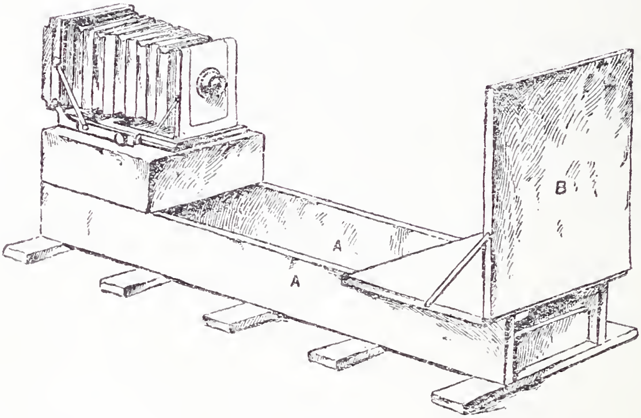


Fig. 39.

The window is entirely blocked excepting a space opposite to the camera and slightly larger than the transparency, this space being covered with fine ground glass. The division being removed from a double slide, the transparency may be inserted in this or in the frame of the focussing screen, the ground glass being removed. The space between the transparency holder and the window must be carefully packed up so as to absolutely exclude all light excepting that which passes through the transparency. This space should be three or four inches. For focussing, a piece of white card the thickness of a negative plate, or a waste negative covered with thin white paper, may be employed. In this method of working the exposure may be made with the cap in the usual manner, and any shielding that may be necessary can be done by screening with card, the image on the plate being a sufficient guide.

The dark-room lamp should be kept burning, but it should be placed in such a position that the direct rays do not fall on the sensitive plate.

The Exposure. This should present no difficulty, as the transparencies should not vary to any great extent. From five to twenty seconds for an ordinary plate, 40 or 50 H. & D., and F 16, under the best possible conditions, should be correct, according to the density and contrast of the transparency, if the reproduction is made the same size. Though this is never the case, it must be taken as a basis for comparing exposures, and the proportion for different degrees of enlargement is here given. If a special transparency or process plate is used, eight times as long should be given.

In all cases it is desirable to make a test exposure on a quarter-plate before exposing the larger size.

Development. In most cases the extreme shadows will show a much greater tendency to veil over than in an ordinary subject, as there is not the depth in the shadow detail in the transparency that would exist in the shadow itself.

Modification. Assuming that in making the transparency a certain exposure will give the nearest approach to a true reproduction, then decreasing the exposure will lengthen the gradations in the shadows and flatten those in the lights. Increasing the exposure will, naturally, produce an opposite effect, and if on making a transparency it should be found defective in gradation, by determining the nature of its defective character, the remedy is at once found in increasing or decreasing the exposure. Longer exposures will improve the shadow detail at the expense of the lighter tones, while shorter exposures will improve the lighter gradations and weaken the shadow details.

A Method of Developing Bromide Enlargements.

By C. WELBORNE PIPER.

FIRST soak the enlargement in plain water for a time sufficient to render it perfectly limp. Pour off the water leaving the print flat and adherent to the bottom of the dish. Have a sufficient quantity of normally-compounded developer, say amidol, at hand in a measure, and also an equal quantity of clean fresh water in a second measure. Apply the developer to the print in the ordinary way, being careful to flow it over the whole print at the first application. Rock the dish steadily for a few seconds, and then pour off the developer and replace it by the plain water, which must be applied as quickly and carefully as a developer. The developer should be off the print before the image has commenced to appear, and the change must be accomplished as quickly as possible, but however quick you may be you will probably see the whole image flash out before there is time to set the dish down. In a few seconds all action will cease, and you can examine the result at your leisure. There is, of course, nothing but a most superficial image in existence, but that image is remarkably clear in all parts that are not under-exposed. Correct exposure is indicated where the image looks almost but not quite perfect, it should be "brilliant," with the lowest tones and finest details lacking. In over-exposure all tones and details will probably be out and there will be a tendency to flatness, but under-exposure will be shown by the lack of any image at all. You thus gain a very clear idea of the precise state of affairs before matters have advanced beyond remedy, which is the first advantage of the method of development. If nothing appears to be wrong you simply pour off the water and re-apply the developer and finish in the ordinary way, but if general slight under or

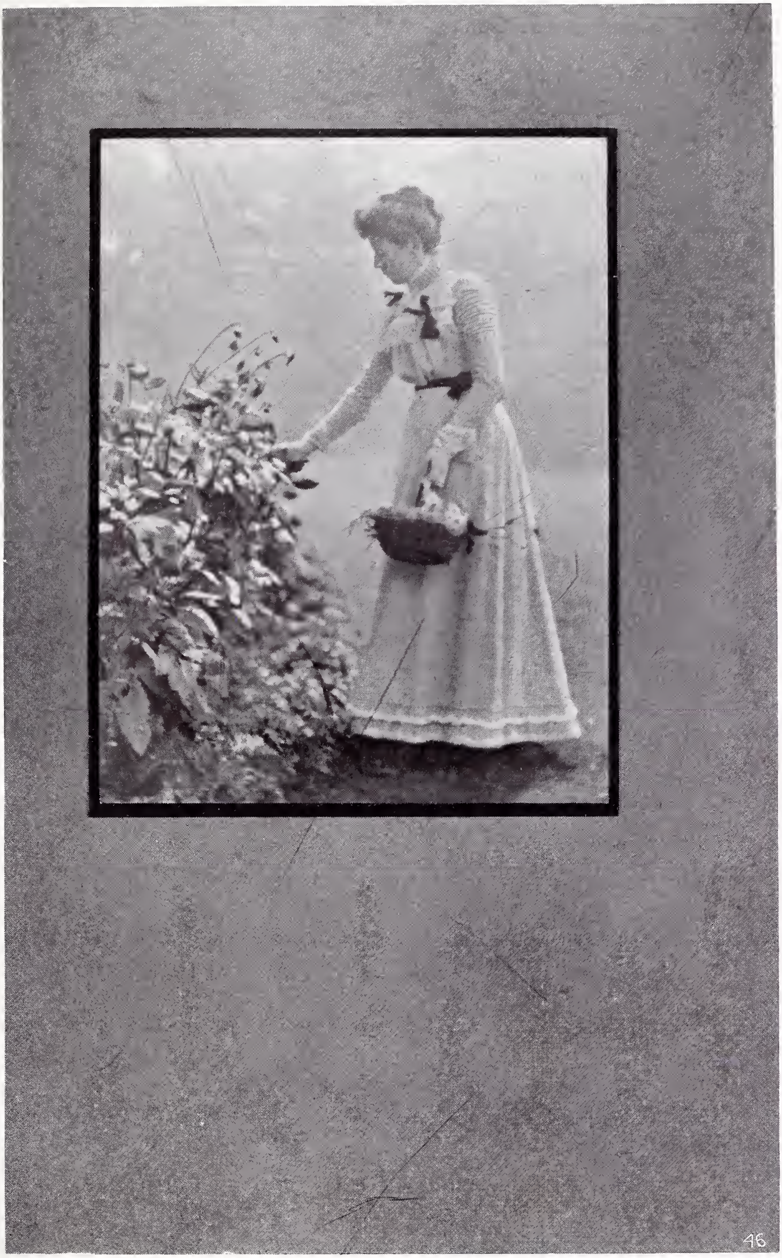


Fig. 21. C. Ponting.

AUTUMN FLOWERS.

(Copper Toning. First Stage. p. 42).

over-exposure is indicated you can finish with a modified developer.

Local Development.

If, however, the defects are local, as they often are with enlargements that have been partially screened or locally "dodged" in any way during exposure, you can resort to local development with a brush under most advantageous conditions. Keeping the print covered with water to the depth of about a quarter of an inch, or a little more, you can apply the developer with a large size camel-hair brush to any part of the print without the slightest fear of producing stains or brush marks. The presence of the water makes no difference to the effect of the developer if your brush is large enough to hold a fair quantity, and you simply paint on developer (or bromide solution) wherever it is wanted without paying any regard to the water at all.

The whole print may be worked up and finished in this way if you care to give the time to the operation, which will be a long one, but it is best to finish with a developer applied to the whole print in the usual way, and the local treatment should aim at bringing the image into such a condition that the final general application of the developer will produce the required effect. Under-exposed parts should therefore be brought out as fully as possible by the brush alone, and correctly exposed parts should be developed nearly up to full density. Over-exposed parts may be brushed over with a little bromide solution and then the application of a normal, or perhaps slightly restrained, developer will complete matters. It should be noted that the brush development of under-exposed parts cannot be very well over-done, as those parts will still hang back considerably in the finishing process.

A large swan size Siberian brush is the best to use and if there is any difficulty in bringing out under-exposed portions of the image a stronger developer should be applied. There ought to be no absolutely undevelopable parts in an enlargement, and the under-exposure referred to is only relative, hence, unless you have blundered badly in exposure it should always be possible to bring out detail.

Exposure.

Exposure.—Bear in mind the following factors. 1.—Light. 2.—Colour and Density of Negative. 3.—Sensitiveness of the Paper or Plate. 4.—Focal value of stop. 5.—Effect required.

Light.—Artificial light being under control, is on this account preferable.

Negative.—Pyro stain has more retarding effect with most artificial lights (e.g., gas) than with daylight.

Paper.—Better to stick to one kind of paper of medium rapidity until experience is gained.

Stop.—See this subject discussed on pages 49 and 63.

Effect.—See notes on errors and defects. In general, to reduce contrasts, extend exposure and shorten development. For accentuating contrasts, reduce exposure, prolong development and increase the bromide in the developer (pp. 44, 45).

Trial strips of paper may often be cut off the edges of sheets that would otherwise not be used for the picture.

Trial strips should have full details written on the back, and then they may be kept for reference until experience is gained.

Test Exposure. How to proceed. (1) Focus the image on the screen. (2) Select some fairly well marked contrast part, *e.g.*, tree trunk against distant hill—or sky. (3) Put on the yellow cap. (4) Pin up the strip of paper. (5) Expose the strip for say 5 seconds. (6) Recap lens, cover up, say one-sixth of the paper by piece of card or folded brown paper. (7) Expose again for another 5 seconds, *i.e.*, $\frac{5}{6}$ of the strip has now had 5+5 or ten seconds. (8) Recap the lens; cover up $\frac{2}{6}$ of the strip, leaving $\frac{4}{6}$ ready for the next exposure. (9) Uncap and expose for 10 seconds—the $\frac{4}{6}$ has now had 5+5+10, *i.e*, 20 seconds. (10) Recap and cover up $\frac{3}{6}$. (11) Expose again the uncovered $\frac{3}{6}$ for 20 seconds, *i.e.*, total 40 for this part now, and so on. We thus get 6 different exposures, each double the next thus, 5″, 10″, 20″, 40″ 1′-20″, 2′-40″.

Suppose that on development we find that 20″ is not quite enough, while 40″ is too much, we now

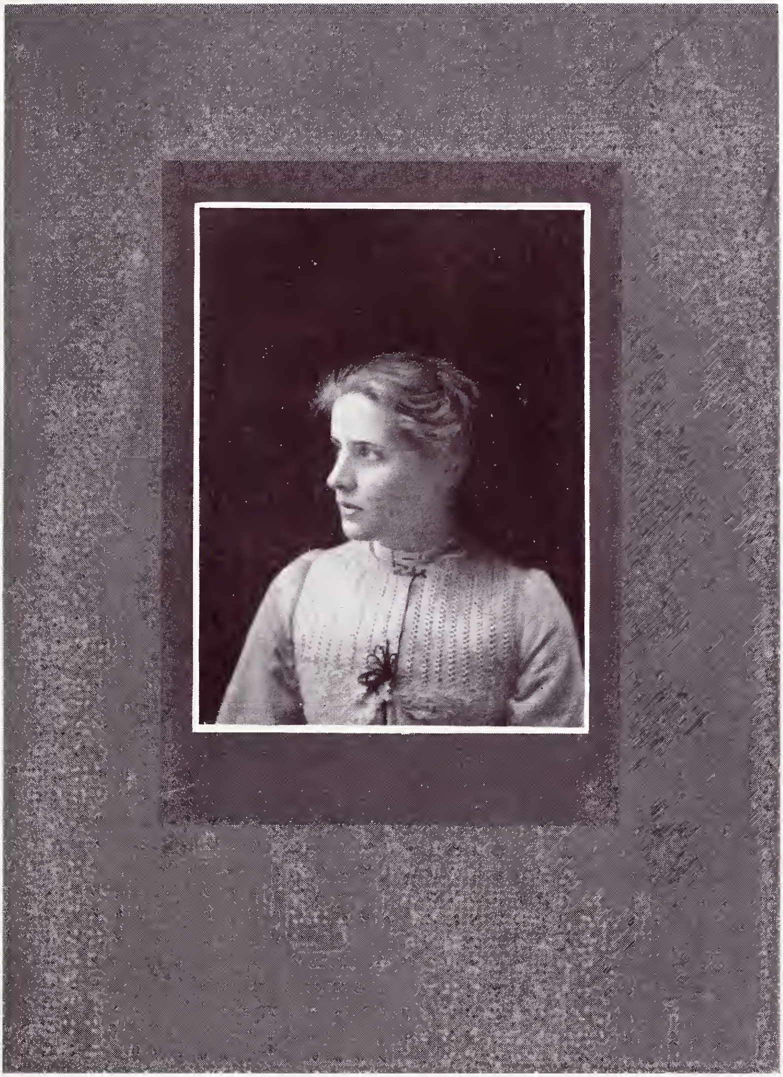


Fig. 22. C. Swift.

PORTRAIT STUDY.

(Copper Toning. Second Stage. p. 42).

take a second strip and begin again with 20″ and increase, not by doubling this time but by even steps of 5 seconds, thus getting a second strip showing exposures of 20″, 25″, 30″, 35″, 40″. Before beginning these step exposures it is useful to stick in the board, just above the trial strip, pins at equal distances marking out the various trial spaces. Each pin is then removed as its corresponding exposure is made, and mistakes thus prevented.

In Fig. 13 we show a trial exposure of four steps where the times are 1, 2, 4 and 8 minutes. Development indicates that the best time is somewhere between 4 and 8. We make a second trial see Fig. 14, beginning with 4 and adding one minute each time, thus getting 4, 5, 6 and 7 minutes' exposure.

Carefully note the difference between the one and the two minutes' exposure; a difference of one minute, but making the second double the first. Then compare with the difference between five and six minutes: as before, one minute difference it is true, but proportionately much less. Hence, remember that equal increments of exposure diminish in effect as exposure increases. At this point also compare the trial strips shown in Fig. 12.

Faulty Development.—The inexperienced worker is very apt to confuse the effects of errors of exposure and of development. The reader at this point is invited to refresh his memory by glancing at Figs. 7 and 8, 10 and 11, and the accompanying notes on pages 12 and 13, in the Library Series of *The Practical Photographer*, No. 1. Then turning to Figs. 15 and 16 we may again see the effect of under and over-development of the same exposure. Now in general it may be said that nine out of ten failures in enlarging are examples of three faults—first, they are of a too contrasty negative; second, under-exposure; and third, over-developing. These two figures should help to drive their warning home. If we have under-exposure (as in this case) it will certainly not make matters better to over-develop. A glance at Fig. 17 will show that the original negative gives a fairly bright contact print, but is not quite soft enough to yield a satisfactory enlargement by gaslight.

Toning Bromide Papers, Etc., Etc.

By Rev. F. C. LAMBERT, M.A.

Copper. After numerous experiments I recommend the following proportions:—Water, 10 oz. (1000 cc.); potass citrate, 1 oz. (100 g.); copper sulphate, 52 gr. (10·2 g.); potass ferricyanide, 45 gr. (9 g.). The quantity of potass citrate is in excess of the usual proportion, but I think it tends to minimise staining. Also I think a fairly strong bath tends less to paper staining than does a weak slow-acting bath, although for the early stage colours the slow bath is decidedly advantageous. Passing the washed print through a clean 10% hypo bath tends to brighten the colours a little, and gives a slight turn of a red print in a pink direction. Five seconds in the above bath is enough to remove the dusty look of some black and white bromide prints. Figs. 21, 22 and 23 show the result of ½, 1 and 3 minutes' toning.

Iron. The somewhat bright green-blue colour of Fig. 23, *The Practical Photographer*, No. 1, shows the effect of moderately prolonged toning in bath No. 3, page 64, *The Practical Photographer*, No. 1. If, however, we select a matt surface paper, slightly dilute this bath with one-third its volume of water, and go to work cautiously, we can obtain a fine range of soft blue blacks which are strikingly effective for certain moonlight, cloud, and seascape effects (Fig. 24). This iron toning process has not received as much attention as it deserves.

New Process? It is difficult indeed to say what is really new in photography. But I here give the results of some of my own experiments, as I am not aware that the same observations have been previously published. Make a 20 grain per oz. solution of potass ferricyanide. To this add dilute ammonia until the mixture smells somewhat strongly of ammonia, *i.e.*, make it decidedly alkaline. Immerse your print, which bleaches to a pale grey image. Wash *well* and darken in a 5 grain per oz. solution of sodium sulphide. Result: a yellow brown image suggestive of raw umber. There is a loss of strength or contrast by this method.

Now to the ferricyanide solution add 20 grains per oz. of potassium bromide, and repeat the process with a second print. We observe that the addition of the bromide results in a return of the original strength of the picture, and also that the colour is less yellow, more Vandyke brown—richer, warmer, less yellow, and more *towards* a purple, though, of course, not showing any purple colour. Thus we can by varying the proportion of ferricyanide and bromide prepare a bath to give the colour of our choice.

Fig. 25 may serve to convey some approximate idea of the colour obtained. The photograph, however, is a somewhat richer brown than the ink print herewith reproduced.

Choice of Paper.—In general, the larger the picture the rougher the grain is a good rule, but with many exceptions. Smooth paper preserves detail; rough paper gives more breadth of effect, absorbing fine details. We may require detail in large prints, *e.g.*, architecture, and general effect in small ones—clouds, landscape. Rough paper requires less finishing or re-touching.

Fixing.—If more than one large sheet of paper be put in the fixing bath at a time, care must be taken to see that the various sheets are not in contact, or fixing stains will probably result. The fixing bath should be gently rocked at frequent intervals, and each sheet turned over and over, bringing the bottom to the top, and so on. Bromide paper is apt to take on stains if a dirty (discoloured, *i.e.*, stale) bath be used.

Washing.—To help to get rid of the hypo it is a good plan to lay the print face down on a sheet of glass, and go over the back with a roller squeegee. Then transfer the print to a dish of clean water, and after five minutes' soaking repeat the squeegeeing. This should be done half a dozen times at least.

Defects.

Foggy Edges indicate deterioration of the paper, possibly from storing the paper in a damp place or where much gas is burnt.

Yellow stains with iron development indicate insufficient or careless use of the acid clearing bath after developing and before fixing. (A remedial bath of dilute oxalic acid may be tried).

Yellowness may result from imperfect fixing, *i.e.*, not long enough time in fixing bath or use of fixing bath which is exhausted, or one which is discoloured by developer contamination.

Grey fog all over the print perhaps indicates light action, *i.e.*, an unsafe developing lamp or light leaking from lantern, or door, or window, etc. It may also be due to use of developer with excess of alkali or insufficiency of bromide.

Blisters.—See *The Practical Photographer*, No. 1, page 62. Blisters may sometimes be prevented by sponging the back of the paper with methylated spirit before development is commenced.

Brown stains and patches may arise from portions of the print being imperfectly fixed, or when large air bubbles are enclosed between the paper and surface of the fixing bath. Hence the necessity for turning the prints over once or twice while in the fixing bath.

Brown stains may also result from contact with dirty or hypo contaminated fingers.

Green back images may be due to prolonged pyro development, or excess of bromide or insufficence of soda sulphite with pyro developer.

Dark specks may be often traced to particles of iron rust coming from the supply tank or pipe. Filter the water by laying a couple of thickness of fine flannel in bag shape over the mouth of the water tap.

Particles of amidol, pyro, etc., floating in the air may cause spots. Undissolved particles of the developer or sediment thrown down from the developer should be carefully removed by filtering or spots are very likely to result.

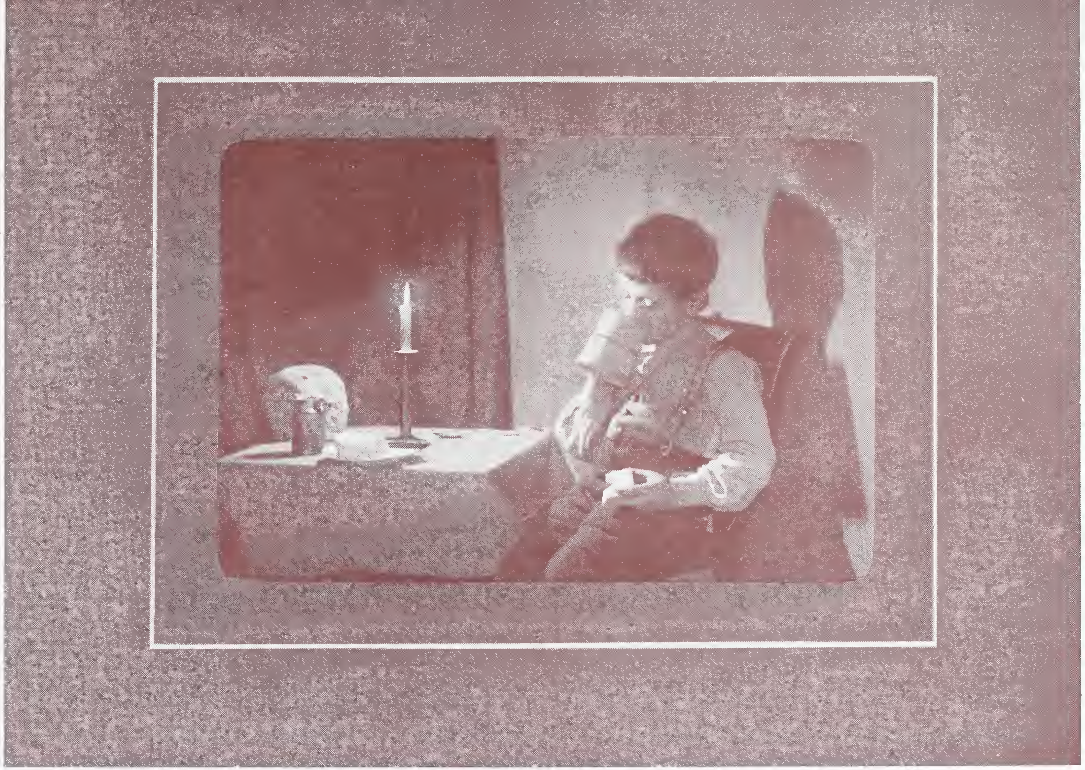


Fig. 23. N. Gibson.

SUPPER TIME.

(Copper Toning. Third Stage. p. 42).

Developer stains, *e.g.*, from stale Quinol, etc., may often be removed by clearing bath No. 2 on page 63 of *The Practical Photographer*, No. 1.

Slightly foggy prints may often be brightened and generally improved by a brief immersion in bath No. 2 or No. 5 given on page 63 of *The Practical Photographer*, No. 1. Care is needed not to overdo this reducing remedy.

Flatness or weakness of image may be due to the use of too strong an illuminant—too large stop, excess of alkali, or deficiency of bromide in the developer or to over-exposure or general light fog. Remedy: slight reduction to clear the fog. Then intensification by mercury followed by the ferrous-oxalate developer.

Hard Prints, too black and white, too contrasty, indicate unsuitable negative, under-exposure, over-development or unsuitable developer.

White Spots.—Perhaps due to presence of dust on the paper during development, or dust on the negative we are enlarging, or air-bells clinging to the paper and preventing the developer reaching these spots.

Black Spots, due to air-bells clinging to the paper in the fixing bath. (See *sub* Brown Stains.)

Dark Scratches, fine line markings. Sometimes caused by the corner of one sheet scratching the sensitive surface of another sheet, or to too much pressing in packing the paper. These markings may be removed by rubbing the surface of the print with a bit of rag moistened with methylated spirit.

Granularity, often due to under-exposure and unduly prolonged or forced development.

Under-Exposure, indicated by tardy appearance of the image, loss of detail and gradation in the shadows, accentuated contrasts of the higher tones. Prolonging exposure only accentuates these failings.

Over-Exposure, shown by abnormally quick appearance of the image. High-lights devoid of gradation, general loss of contrast, shadows too solid and flat. Colours tending to grey rather than a real black.

Bolting Cloth.

BOLTING silk or bolting cloth is the name of a woven silk net-like material of fine size of mesh used for the bolting or sifting of flour in the mill. Hence it is sometimes referred to as milling silk.

The modern desire among photographers for general effect rather than minute detail, led to the use of this material as a diffusing or softening screen and, provided it be used with some discrimination, the effects produced are conspicuously advantages when compared with prints from the same negatives without its intervention.

Effect. In general it softens and subdues detail and reduces the apparent light and shade contrast, aiding in breadth of effect. Particularly useful in patchy and spotty compositions.

How used. It is kept flat on a stretcher or frame (see below), and held almost in contact with the paper or the easel during either the whole or part of the exposure time. The longer it is in use the more its effect. The closer to the paper the less it diffuses the light and more it shows its pattern. The finer grades diffuse more than the coarser kinds. Focussing should, of course, be done before the screen is put in position.

Holder or Stretcher. Some workers use a light wooden frame. The present writer prefers a card stretcher. Procure some stout, stiff mill or strawboard, cut a frame having a two-inch margin all round. Fix the cloth to this by gum paper. Punch a series of holes in the card about midway between the margin and opening, and, say, 3 inches apart. These holes may by $\frac{1}{8}$ or $\frac{1}{4}$ inch in diameter. Stout steel pins pass through these holes into the easel board in a slanting direction, and so hold the frame close to the wood.

Creases in the cloth may be removed or subdued by damping and ironing with a rather cool iron. When not in use the

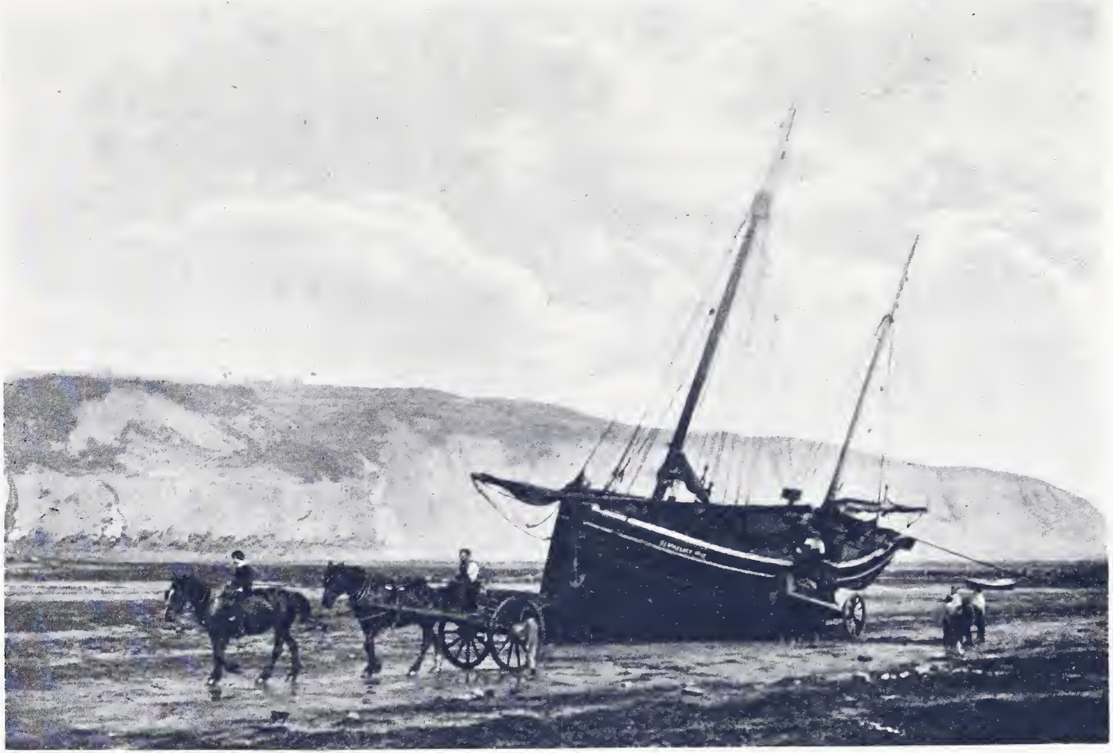


Fig. 24. J. Maud.

THE COAL BOAT.

(Iron Toning. Early Stage. p. 42).

screen should be put away out of dust and dirt, or markings will arise. The finest kinds may be used in actual contact with the paper, but the more open mesh will generally be used about ¼-inch away from the paper.

Illustrations. The reader is asked to make very lenient allowances for the great difficulty in reproducing the screen effect. Some of the figures may help to convey some idea to the beginner's mind as to the effect produced. In general, we may term it a rounding and softening effect. In Figs. 17 and 18 we contrast an ordinary contact small print and the effect of an enlargement with bolting cloth. Again, in 19 and 20 we may compare the same enlarged bits of small negatives with and without the intervention of bolting cloth. These reproductions are from small portions of large prints. They should be viewed at such a distance from the eye that we just fail to see the grain effect due to the bolting cloth in Fig. 20.

Selecting your picture will be easier if you happen to possess a transparency positive or lantern slide of your negative to project on the focussing screen.

The glass side of your negative should be very carefully cleaned with a bit of rag moistened with methylated spirit, and the film side also carefully dusted.

Masking the Negative.—In all cases, the less light in the dark-room not going to form the picture the better for the enlargement. Thus, if we are using only a part of a negative, say, the head of a half-length figure, it is advisable to roughly cut out a mask of black paper with an opening somewhat larger than the part of the negative to be used. If this mask is put in the rebate of the negative holder before the negative is put in place, the paper will be held in place. In no case should there be any light passing through clear glass round the edges of the negative. This strong light is diffused by the dust in the air, or by any object upon which it falls, and so is helping to fog the paper (or plate) during the exposure.

Sky and Cloud Printing.

IF suitable clouds are in the landscape negative it is only a matter of shading the land part during part of the time so as to give time for the clouds to print. To illustrate this, let us glance at Fig. 26 where we see a trial strip print showing exposures of 5″, 10″, 20″, 40″, 1′-20″ and 2′-40″. From this we deduce that an exposure of about 15 seconds is sufficient for the land part, while something like 2½ minutes is required for the cloud portion to print. In Fig. 27 we show the effect of exposing the land for 15 seconds and the sky part for an additional 2½ minutes, of course, shielding the land during the extra exposure time.

If different negatives are to be used for land and sky we may first expose for the land part. Cap the lens—mark on the margins of the paper where the sky line comes, cut out a suitable card mask, remove the land negative and replace it by the sky negative and readjust the position of the paper. The sky and cloud exposure is then made and the two parts developed in one operation.

Or we may make our land exposure, then with a very dilute developer, just bring out the land sufficiently to show the sky line, rinse the print, hold up to drip, and then return to the easel board. The yellow glass cap enables us to adjust the paper and sky negative when the cloud part is exposed. The faintly visible sky line image is also a help in this case showing us exactly where to hold the card mask. After the second exposure the print is returned to the developing dish and finished either by local development, *q.v.*, or in the usual way.

Two of the commonest failings in bromide enlargement of landscapes are (1) entire absence of cloud—or atmosphere—and (2) exaggerated sky and cloud effect due to over-exposure.

Cloud negatives may be used either way round, provided, of course, that the direction of lighting is in harmony with that indicated in the landscape.

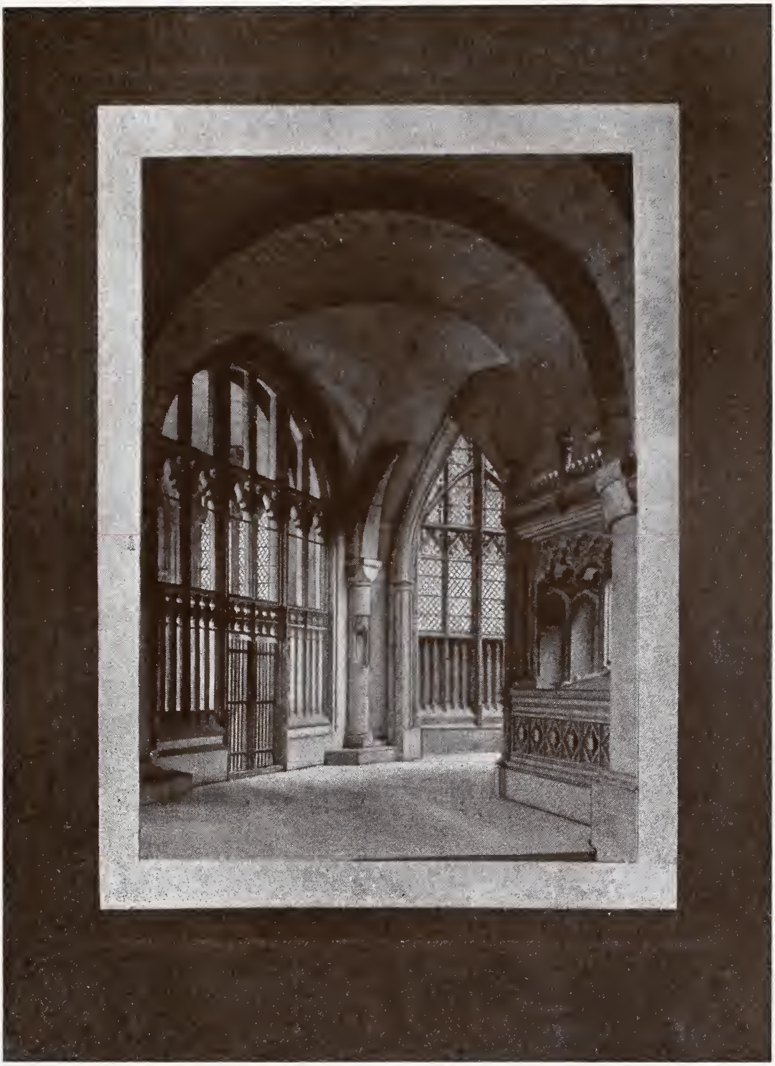


Fig. 25. E. T. Clark.

NORTH AMBULATORY, GLOUCESTER.

(Ferricyanide with Bromide Process. p. 42).

To repeat an Enlargement (same size as before). Pin up the first enlargement on the easel and adjust until the two images coincide. This is far more exact than working by measurement.

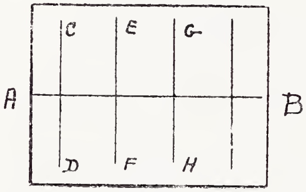


Fig. 40.

Scale or Magnification.—Take an old negative of your usual size of working. Lay on it a straight flat ruler and with a stiff steel pin cut a sharply defined scratch through the film, running from side to side, joining the middle points (A. B., Fig. 40). Then at right angles to this line rule two or more lines, exactly one inch apart (C D, E F, G H, etc). Suppose that we wish to enlarge a negative "three times." This scratched negative is put in the holder and the apparatus adjusted so that the one inch distance between the upright lines E F and G H just measures three inches on the enlarging easel. This test negative is also useful in helping us to get all parts of our negative equally sharp, as the edges of the scratches on the focussing screen are easily seen. It also helps us to guard against distortion by getting the easel out of its proper position.

Size of Stop.—When enlarging we are not concerned with any question of "depth of focus," as our object is now all in one flat plane. The choice of stop, therefore, is a question regulating the strength of light and sharpness of definition.

Depth of Focus.—It should be remembered that the shorter the focal length of lens the more "depth" for the same *f.* value or aperture. That is to say, by taking a quarter-plate negative *f*/8 and say 6-inch focus and then enlarging to 12 × 9 we should get more depth of focus than by taking a 12 × 9 negative direct with say a 10-inch focus and *f*/8 stop.

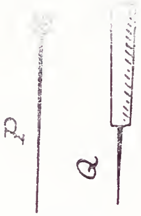


Fig. 41.

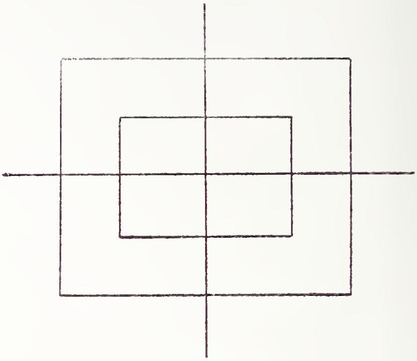


Fig. 42.

Pincushion.—A large sausage shaped pincushion, made of red flannel and filled with sawdust, should hang to the side of the easel.

Pins of steel with black glass heads, as shown in Fig. 41, are useful, as are also the wooden handled forms, here shown.

Small drawing pins are used when we are employing bolting cloth.

The face of the easel board should be covered with a sheet of thin white drawing paper. First pass a wet sponge over the back of the paper and after a couple of minutes remove any surface wetness from the paper, then apply ordinary flour or starch paste round the margins for a width of say, a couple of inches, turn it over and lay it on the board. Flatten out the paper, cover with a couple of sheets of clean blotting paper and let it dry under pressure. When dry the paper will be flat and taut. Now with a good black pencil rule lines as shown in Fig. 42, giving the various sizes of paper that you are likely to use. These will be of great help when arranging the size and proportion of the enlargement. This paper-covered board will be found of use when centring the light.

Focussing.—A fairly large hand reading glass will be found very helpful when focussing the enlarged image, as this enables one to examine detail without putting one's head too close to the easel or in the way of the light.

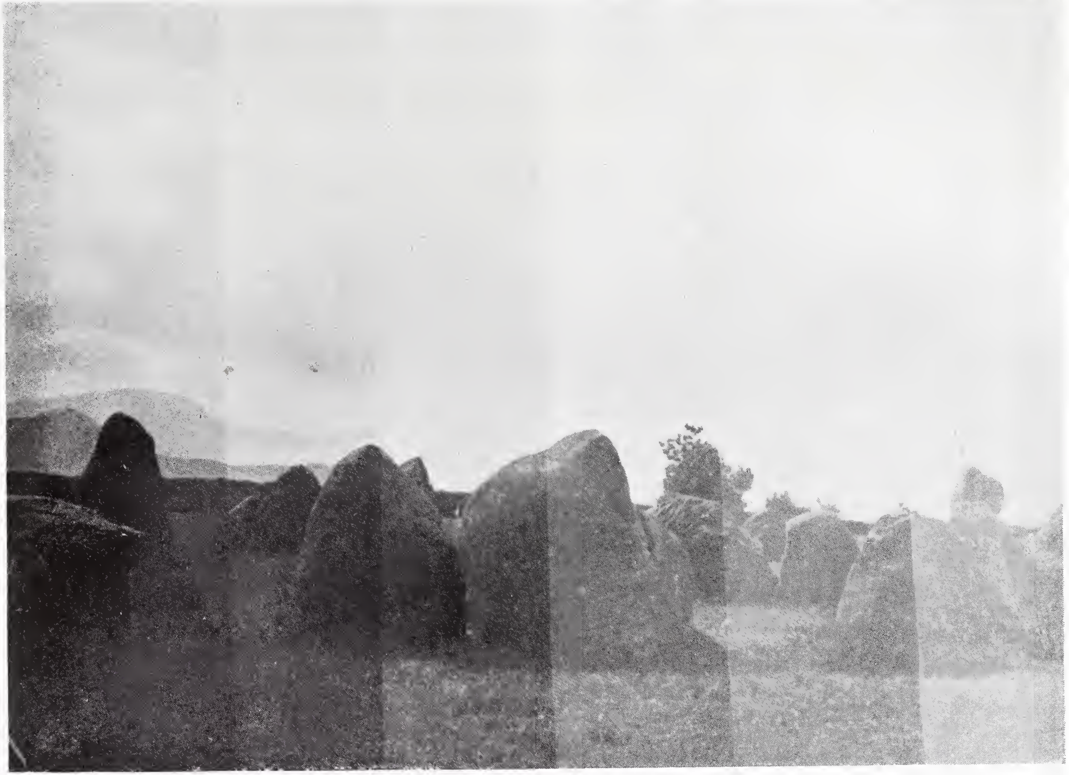


Fig. 26. F. C. Lambert.

TRIAL EXPOSURES FOR LAND AND SKY (p. 48).

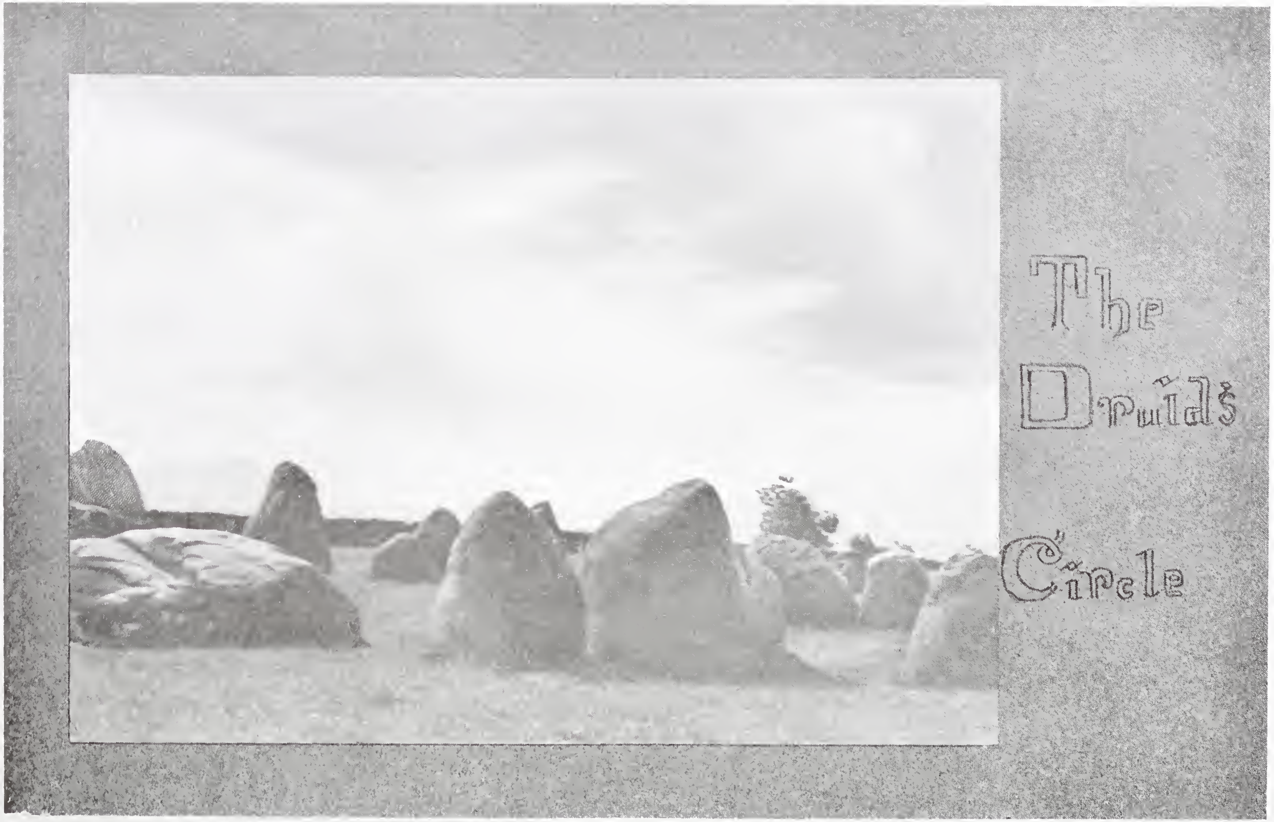


Fig. 27. F. C. Lambert.

SKY AND LAND FROM SAME NEGATIVE BY LOCALLY CONTROLLING EXPOSURE (p. 48).

Hints on Making Wooden Developing Dishes.

By F. C. BURTON.

THE best material to employ for this purpose is teak. This wood is cheap, even in grain, does not warp, and is easy to work. The thickness should vary with the size of the tray. For sizes up to 15 × 12 half-inch material is amply thick enough. Two courses are open to us. We may make our trays of wood only, *i.e.*, sides and bottom, or we may use a stout sheet of glass for the bottom of the tray and wood for the sides and ends.

In Fig. 43 we show the simplest way of putting the corners together and fitting ends A and sides B to the bottom C. The surfaces in contact must be very carefully planed and squared, then glued, and finally screwed. Recipes for suitable waterproof glue are given on page 62. A still better way is to join the ends and sides by a "tongue and groove" joint. But in that case the end E must project a little beyond the side D, so as not to bring the groove joint too near the edge or end of the wood.

If a glass bottom is to be employed, a groove must be cut to receive it. A glance at Fig. 43 will make this clear. Towards the left we see the tongue end T of one side S; and on our right is the groove G to receive the tongue T, with projecting wood at E.

Below is shown the groove P cut in the wood to receive the plate of glass. This should be fairly thick, and quite flat. One may often buy a good stout sheet of discarded plate looking-glass for a modest sum.

The glass bottom should be a fairly good fit, but not "jam-tight." Before glueing and screwing, the groove P is lined with some of the bedding putty mentioned on page 61, the plate-glass being then inserted will squeeze out some of the putty. This is at once scraped away with an old knife The tray is allowed to dry thoroughly in a warm place, and then coated with some one of the various mixtures given on page 62. If the simple form of box tray be selected we may line it with a piece of

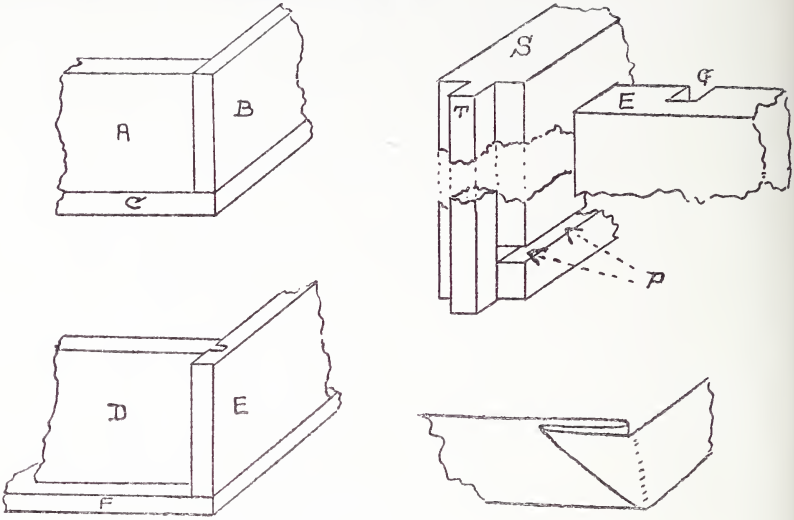


Fig. 43.

white and shiny American cloth. Some workers prefer to use Willesden (waterproof) paper rather than American cloth, as the latter tends to leak at the creases. Before attempting to fold or crease the Willesden paper first make it quite limp by soaking in water. It then may be creased with but little danger of damage. It may be bought up to about five feet wide, and in various grades of thickness. The corners should be neatly folded into dog ears, as shown in Fig. 43. A few small drawing pins along the top edge of the tray will serve to keep the cloth in place. This American cloth method should be only regarded as a temporary makeshift, the other (waterproofing of the wood) methods being preferable.

A few words of caution are needed with regard to the use of wooden trays. (1) If they have not been in use for some little time it is quite likely that they may have "sprung a leak," therefore test them by filling up with clean water, and let them stand for half an hour. In any case this is a good plan, as it tends to prevent any chemical solutions penetrating into the wood. (2) Always wash out wooden trays, and set them to drain and dry as soon as possible after use. This will greatly help to keep them in working order. (3) When determining the thickness of wood to be employed in making these trays, bear in mind the probable weight of water they must sustain. The bottom may desirably be somewhat thicker than the sides. (4) If teak cannot conveniently be obtained, the next best thing is straight-grained oak or pitch pine. (5) All newly made trays, after waterproofing and drying, should be filled with cold water, allowed to stand an hour or two, emptied, and refilled. This should be repeated half a dozen times.

How to Fit a Yellow Glass Cap to your Lens.

FIRST obtain or make a short card tube that is an easy fit to your lens. If the lens be small, perhaps a piece cut from a paper tube may serve. Next get a piece of orange glass and cut it an easy fit to the tube. Then cut a couple of strips of stout card ¼-inch wide and just long enough to fit inside the tube when the ends are together. The two inside rings are to hold the glass. A glance at Fig. 44 will show the arrangement of parts as seen in section. A is the outer tube, which is an easy fit over the hood of the lens. D is the glass; above and below it we have C and D, the two card rings. The lower one, C, is first fixed in position by glue or seccotine, the glass is then dropped into position and, finally, the upper ring B is fixed.

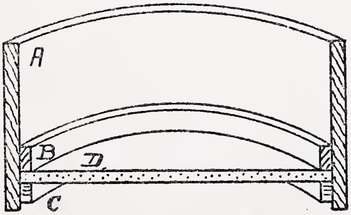


Fig. 44.

To make an Orange Glass Screen. This may be useful in connection with a cap for the lens or dark-room lamp. Take any ordinary plate (which may have been light fogged, but has not been developed) and fix this thoroughly. Then wash and let it dry. We now have glass coated with gelatine. All we now need do is to stain this with any suitable orange dye. For the purpose a saturated solution of potass bichromate will serve. For a lens cap it is well to make two such yellow gelatine screens and put them film to film.

Another method is to dissolve 20 grains of gelatine in an ounce of saturated solution of potass bichromate by the aid of gentle heat, then to coat an old negative glass from which the previous gelatine coating has been removed. A saturated solution of picric acid makes a good yellow dye, or we may use the penny packets of orange dye purchased at any oil shop.

Cautions! Do not attempt any focussing while the yellow glass cap is on the lens. Focussing should be done before the glass cap is put on the lens.

2. A yellow glass which may be safe enough for bromide paper would be quite unfit for use with plates unless of very low speed. For plates we require a deep ruby combined with orange or, preferably, three gelatine-coated glasses stained with solutions of aurantia, naphthol yellow and methyl violet 6B.

Care of Oil Lamps.—The outside should be wiped with a soapy flannel to prevent disagreeable smell. Good oil is nearly free from smell or colour. Camphor should not be added to the oil as it tends to give a smoky flame and clog the wick.

The wick should at first be carefully cut with very sharp scissors and subsequently cleaned by nipping with a dry rag.

The extreme corners of the wick should be cut off to prevent forking of the flame.

Qualities of a Negative suitable for Enlarging.

1. Freedom from scratches, spots and stains, etc.
2. Uniform in colour and not pronouncedly stained by pyro or other developer.
3. Free from excessive density contrasts.
4. As sharply focussed as the pictorial nature of the subject requires, with a corresponding degree of shadow detail.

Too little is better than too much contrast. The former can be partly compensated for by reducing the strength of light used, or by a screen of ground glass between the light and the negative.

Scratches, pinholes, etc., should be as accurately retouched as possible before the negative is enlarged. It is usually easier to remedy a small defect on the negative than a large one on the print. Moreover, if the negative retouch is still unsatisfactory, we have a chance of mending matters on the print.

Thin, flat negatives require a subdued light and small stop. Over-exposure must be carefully avoided. Light may be subdued by fine ground glass between the lamp and negative. Developer should contain a minimum of alkali and a full proportion of bromide. For such cases quinol or amidol is suitable (12B).

Strong-contrast negatives require a strong light, a large stop, liberal exposure, minimum of bromide and quick development. Metol or rodinal or eikonogen is suitable (12A).

Figs. 12A and 12B serve to show the *difference* between a rather contrasty and a slightly flat negative. The times of exposure of each strip were the same. Commencing from the top they were 5″, 10″. 20″, 40″, 1′ 20″, 2′ 40″, and 5′ 20″.

Over-dense contrasty negatives should be reduced by the ammonium persulphate reducer given in bath No. 3, page 63, *The Practical Photographer*, No. 1.

Over-dense flat negatives should be first fog-cleared by bath No. 2, *The Practical Photographer*, No. 1, and then they may be intensified slightly in the usual way.

Distortion.—Care must be taken to see that the easel is parallel to the plane of the negative, and that the optic axis of the lens is central and perpendicular to these two parallel planes. A carefully-ruled scale negative (p. 49) and focussing board (p. 50) are great helps in guarding against distortion.

Should the original be distorted owing to the camera being tipped up or otherwise wrongly used when taking the original negative, we can largely if not entirely compensate for this by similarly tilting the negative, and also the easel, and using the same lens that was used when taking the original negative. In such cases the scale of enlargements should not be less than double and preferably not less than treble.

Distortion may be due to the lens. In this case we must use the same lens again and preserve the same relative positions of stop, glass, and negative. Thus if the stop was between the negative and lens in the taking, it must be the same in the enlarging.

Paper Negatives.—Some manufacturers supply emulsion-coated paper for stripping or negative-making.

Thin smooth rapid bromide paper may be used for making negatives. But in this case development must be carried farther than when used for positives. Density must be judged by looking through the paper and allowance made for the semi-opacity of the paper.

Paper for large negatives has the advantage of economy, less risk of damage, less room required for storing, and that retouching can easily be done on either the paper or coated side (the paper side for broad effects, the film for fine detail).

Suggestions for making paper more transparent for printing purposes will be found on page 61 of this number, and also on page 61 of *The Practical Photographer*, No. 1.

Light from the Dark-room Lamp.—Matters should be so arranged that the light from the dark-room lamp does not fall direct on to the enlarging easel. If the lamp cannot be moved, then a piece of red Turkey twill should be suspended from the ceiling in such a way as to screen the easel.

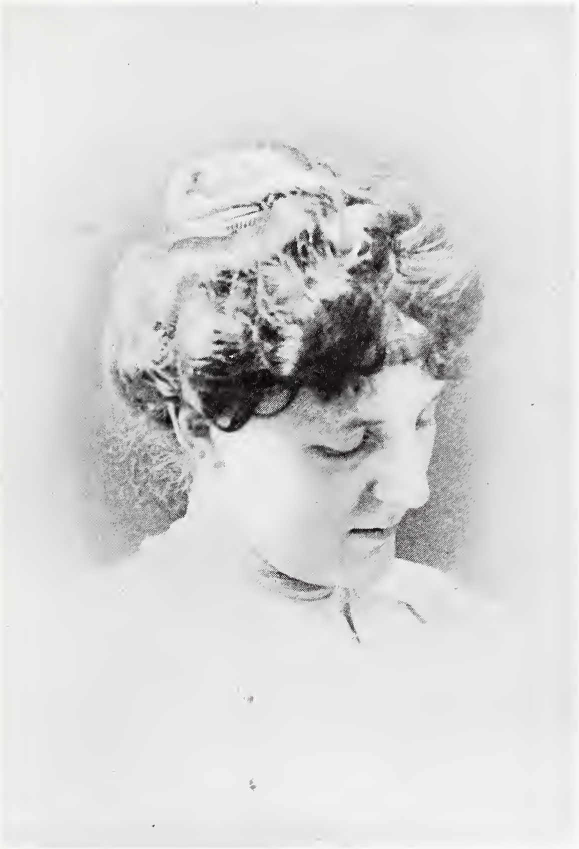


Fig. 28.

FAULTY VIGNETTING.

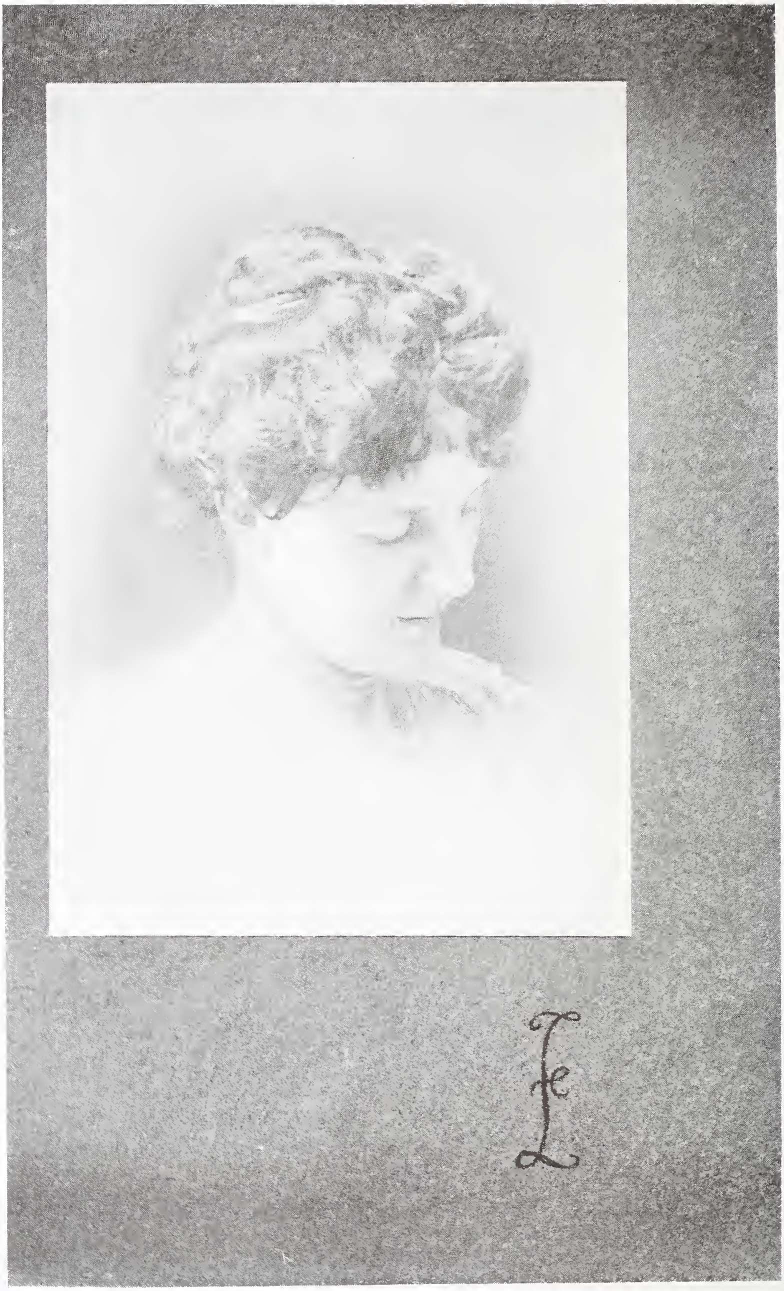


Fig. 29. F. C. Lambert

INITIAL STAGE OF FINISHING A VIGNETTE.

Finishing.—This, like cloud printing, is very apt to be carried to a harmful excess. The beginner is strongly urged to aim at a minimum rather than a maximum of hand work. In Figs. 28 and 29 we show a vignetted head, and precisely the same thing with a quite moderate amount of suggestive hand work. For manipulatory details see pages 24-28.

Vignetting.—In Figs. 28 and 29 we show the effects of the vignetting card being held at different distances. In 28 part of the hair has been insufficiently exposed. Also the vignetter has not been moved about sufficiently, so the edges are too abrupt.

Local Treatment.—In all cases, *i.e.*, of local developing, reducing, toning, etc., the whole sheet must be frequently flooded with water, otherwise hard outlines and local markings may result.

Brush Development.—Soak the paper in water until quite limp. Lay on a sheet of glass or wooden drawing board. Blot off the surface moisture and apply the developer with a soft brush or pledget of cotton wool. The developer should be mixed with an equal quantity of glycerine.

Vignetting is generally done by means of a perforated card with tooth edges. By tilting the oval into various angles we may obtain a long narrow opening. By moving it nearer the light we get a larger shadow opening with softer edges. By rotating it we prevent tooth-like markings.

Shielding.—When shielding any part, the card should be gently moved towards and away from the lens.

Local Exposure is one of the most important factors in pictorial work. The most useful shield is a sheet of stout card. At times, a fringe of cotton wool may be gummed to the edges. A disc of card may be fastened to the end of a fine stiff wire, but care must be taken to rotate the wire round the pictorial field, otherwise its shadow may show. A disc of card may be suspended by means of two threads from each side. At the end of the threads we have loops passing over our finger ends whereby we may control its position.

The yellow glass cap readily enables us to cut out such masks of any desired shape, and also to try their shadow effect.

Large Paper Prints may be developed, fixed and washed without the employment of a tray at all. In this case the piece of paper should be a full inch all the way round larger than the picture required. After exposure this marginal extra strip is folded upwards and the corners held by a strong spring clip. The paper is then laid on a flat board, sheet of glass, or other suitable support. Developer is poured on and, in the case of a large sheet, is evenly spread by means of a tuft or ball of cotton wool or *very* soft sponge. It is obviously desirable to use a slow-acting developer to give ample time for controlling its action. After development and rinsing fixing takes place in the same way, and finally washing. In this last case the print should be swabbed with a sponge back and front, and the back squeegeed at frequent intervals.

Vibration.—Avoid leaning upon or touching the table supporting the lantern, lens, camera or easel, and also avoid walking about the room during exposure, or blurred, shifted images are not unlikely to result.

Uneven illumination is more likely to arise with a short than with a long focus lens.

Retouching on a small negative will show far more on an enlargement then we should imagine by inspecting a small print. See Figs. 15 and 16.

Counting Seconds.—If you do not happen to possess a dark-room clock, the following is a simple dodge for aiding one to count seconds. At the end of a piece of string between 39 and 40 inches long fix some small heavy object (ball of lead, etc.) and from this let there hang down a bit of thin chain of any kind. On a long nail in a wall hang your string pendulum and put an old tin canister at such a height that the bit of chain just "clinks" against it at every swing of the bob.

System.—A rational system of procedure will save much time and trouble. Try the following: Trim the lamp or light, put in the scale negative, get the easel in the desired position. Remove the negative and get even illumination of the screen by adjusting the position of the light. Put in the selected negative and re-adjust the focus if needful.

Notebook.—A notebook record should be made of every experiment, at any rate until a considerable experience has been acquired. Failures as well as successes being all carefully entered, constant reference to past experiments will facilitate progress more than any other help. As a book for this purpose does not seem to be on the market, we suggest that the reader obtain a plain ruled school exercise book and rule in black ink columns for his own needs. Paper is cheap enough, therefore allow yourself plenty of room for entering details in the dim light of the dark-room. Fix a pencil by a bit of strong thread to the book so that it may be readily found. Subjoined we give the suggested columns for the right and left-hand pages respectively with one or two typical entries. Of course, the reader will add any other column to meet his own needs:—

LEFT-HAND PAGE.

No. of Neg.	Subject.	No. of Experiment.	Paper.	Date.	Light.
563	Hayfield.	72	Barnet, Rough.	Nov., 11 a.m.	Bright sun.
645	Portrait.	84	Wellington C.C.	...	Incand. gas.

RIGHT-HAND PAGE.

Lens.	Stop.	Scale.	Exposure.	Developer.	Result.
Dallmeyer Stigmatic.	*f*/8	$\frac{4}{1}$	20 sec.	Amidol.	Over-exposed.
Ross R.R.	*f*/8	$\frac{3}{1}$	2 min.	Unal.	Slightly under-exposed.

Bromide Enlarging.
Notes, Hints and Formulæ.

By THE EDITOR.

Developers.

Glycin. Water, 30 ozs.; soda sulphite, 1 oz.; glycin, 90 grs.; soda carbonate, 2 ozs.

Kachin. A. Water, 20 ozs.; soda sulphite, 2 ozs.; kachin, 150 grs. B. Water, 20 ozs.; potass carbonate, 1 oz.; potass bromide, 4 grs. Use equal parts of A and B.

Edinol. Water, 20 ozs.; soda sulphite, 1½ oz.; edinol, 90 grs.; potass bromide, 2 grs.; acetone, 2 oz. After development, which takes place somewhat rapidly, wash in water 100 parts, acetic acid 1 part, and again wash in water before fixing. Another formula: Water, 4 ozs.; soda sulphite, 120 grs.; edinol, 15 grs.; soda carbonate, 150 grs.

Synthol. Water, 10 ozs.; sodium sulphite *(pure)*, 150 grs.; synthol, 15 grs. Filter before use.

Imogen Sulphite. A. Water, 12 ozs.; soda sulphite, ½-oz.; imogen, 40 grs. B. Cold saturated solution soda carbonate. Take 3 parts A and 1 part B.

Rodinal Development.

	A	B	C	D	E	F
Water …………	2 ozs,	2 ozs.	2 ozs.	2 ozs.	2 ozs.	2 ozs.
Rodinal…………	5 min.	30 ozs.	5 min.	20 min.	5 min.	50 min.
Potass bromide.	⅒ gr.	½-gr.		⅒-gr.	½-gr.	1 gr.

In doubtful cases commence with A until all detail obtainable is visible, then obtain required density with B.

For under-exposures commence with C and finish with D.

For over-exposures commence with E and finish with F.

Fixing Baths.

1. Water, 20 ozs.; hypo, 3 ozs.; potass metabisulphite, ½-oz. This bath does not readily discolour.
2. Water, 20 ozs.; hypo, 4 oz.; soda sulphite, ½-oz.; soda carbonate, 1 dram. This bath stops the action of an acid developer. (See p. 63 *The Practical Photographer*, No. 1).

Test for Hypo in the Wash Water.

Potass permanganate, 2 grs.; potass carbonate, 20 grs.; water, 4 ozs. In a white egg-cup put a teasponful of water. Add a few drops of the test until the solution is pale pink. Let the drippings of a print fall into this. If the colour is turned green or discharged, the print is not yet hypo free and requires more washing.

Toning Baths.

Hypo-Alum. Water, 70 ozs. ; loaf sugar, 2 ozs. ; hypo, 10 ozs.; alum, 2 ozs. The addition of sugar is said to make the action more uniform. (See pp. 49 and 64 *The Practical Photographer*, No. 1).

Hardening Baths.

Bromide prints must not be dried by heat, unless the gelatine has been previously rendered insoluble, or the picture will melt and be spoiled.

1. Formalin, 1 part ; water, 20 to 30 parts.
2. Solution of aluminium acetate, 3 parts ; water, 100 parts.
3. Chrome alum, 1 part ; water, 20 parts.

No. 1 is preferable. Immerse the print for five minutes ; wash for fifteen minutes in running water ; surface dry by lightly pressing between sheets of fluffless blotting paper. Then dry before the fire.

To render Paper Translucent.

1. Canada balsam, 1 part ; turpentine, 5 parts.
2. Castor oil, 1 part ; alcohol, 2 parts.

Polishing Paste for Bromide Prints.

1. Paraffin wax and oil of lavender mixed to the consistency of batter. Rub lightly with tuft of cotton wool.
2. Mix 2 ozs. salad oil, 2 ozs. terebine, and the contents of a twopenny tin of globe polish. Rub lightly and finally polish with terebine.

Bedding Putty for Glass-Bottomed Dishes.

1. Mix together 3 parts plaster of Paris, 3 parts litharge, and one part resin ; make into stiff paste with boiled oil and dryers.
2. Mix together litharge and glycerine to a treacle-like consistency, and apply to the wood grooves prepared to receive the glass.

Waterproof Coatings for Wooden Dishes.

1. Melt together in a water bath equal parts of gutta-percha and paraffin wax. Mix thoroughly and apply with stiff brush, hot. Then, when this coating is dry, rub with a flat iron just warm enough to make the coating penetrate the fine cracks of the wood.
2. Take 2 parts of common resin and melt in a saucepan, heating until it begins to give off a steam-like vapour. Now add one part of rubber cut into small pieces, and stir with a wooden rod until the rubber is melted. Remove the pan from the fire and slowly stir in two parts of boiled linseed oil. Apply this mixture when nearly cold to the wood.
3. Obtain some "hard" paraffin wax, and melt by gentle heat in an old jam-pot. Make the wood warm and apply the melted wax. Then pass a warm iron over it several times. The outside of a wooden tray may conveniently be painted with a couple of coats of bath enamel.
4. Equal parts of resin and beeswax are melted together by gentle heat and brushed over the woodwork, and then persuaded to penetrate the pores of the wood by a *hot* iron.
5. Mix together 4 ozs. asphaltum, 10 ozs. mineral naphtha, and 30 to 40 grains of pure masticated rubber. As the mineral naphtha gives off an explosive vapour, this mixture must not be brought near a fire or light. Operations are best done out of doors. Three coatings of this solution should be applied to the wood.
6. Teak wood, if well coated with Brunswick black and thoroughly dried, is quite serviceable for photographic purposes.
7. Melt 20 parts of resin and slowly add, with constant stirring, 4 to 5 parts of nut oil.
8. Shellac varnish prepared thus may be used for waterproof wood :—Shellac, 2 ozs. ; Venice turpentine, ½-oz. ; spirit of turpentine, 1 oz. ; methylated spirit, 10 ozs.
9. Melt together 4 parts Swedish pitch, 2 parts vulcanized rubber, and 1 part resin. Melt in an iron saucepan over closed fire, as the mixture is inflammable. Apply to the wood while hot.

Waterproof Glue.

1. Soak an ounce of common glue in water until it is swelled soft and will absorb no more water. Then drain away all the unabsorbed water. Add one dram of a saturated solution of potass bichromate, and melt together by gentle heat. The trays, after glueing and screwing together, should be left for a few days in daylight or a few hours in strong sunlight.
2. Soak ordinary glue in water as mentioned in recipe No. 1. Pour off the water, dry the swelled glue by placing it on a towel, then cover with boiled linseed oil and melt in the usual way.

Table showing the altered *f.* value of various stops when enlarging :—

Ratio.	1½ Times.	$\frac{2}{1}$ Double.	2½ Times.	$\frac{3}{1}$ Treble.	3½ Times.	$\frac{4}{1}$ Quadruple.
Nominal value of stop.	Value of stops under above conditions.					
f/6	*f*/15	*f*/18	*f*/21	*f*/24	*f*/27	*f*/30
f/8	*f*/20	*f*/24	*f*/28	*f*/32	*f*/36	*f*/40
f/11	*f*/27	*f*/33	*f*/38	*f*/44	*f*/55	*f*/55
f/16	*f*/40	*f*/48	*f*/56	*f*/64	*f*/72	*f*/80

Example. Suppose that we are using stop marked *f*/8, and are enlarging to double size, then this stop is really working at *f*/24. Further, let us suppose that under these conditions we find 80 seconds to be a satisfactory exposure, and we now wish to enlarge with same stop to 3½ times. The real value of the stop then becomes *f*/36.

The exposure must be therefore increased in the ratio of 36 × 36 to 24 × 24, *i.e.*, 9 to 4, *i.e.*, 2¼ times, and therefore becomes 80 × 2¼, or 180 seconds.

Table showing *comparative* times of exposure for different degrees of enlargement :—

	Same Size.	Double.	Treble.	Quadruple.	Quintuple.
Ratio of Exposure ...	4	9	16	25	36
,, to same size ...	1	2¼	4	6¼	9
,, ,, Double	$\frac{4}{9}$	1	$1\frac{7}{9}$	$2\frac{7}{9}$	4
,, ,, Treble.........	¼	$\frac{9}{16}$	1	$1\frac{9}{25}$	2¼
,, ,, Quadruple...	$\frac{4}{25}$	$\frac{9}{25}$	$\frac{16}{25}$	1	$1\frac{11}{16}$
,, ,, Quintuple ...	$\frac{1}{9}$	¼	$\frac{4}{9}$	$\frac{25}{36}$	1

Thus comparing the exposures of double and treble we see they are as 9 to 16, or 1 to $1\frac{7}{9}$, or $\frac{9}{16}$ to 1. Again, to ascertain the exposure for quadruple size which corresponds with 10 seconds when the enlargement is double the original, we have a rule of three, thus: as 9 is to 16 so is 10 to required time, *i.e.*, multiply 10 by 16 (=160) and divide by 9 ($\frac{160}{9}$ = 18 nearly).

To find the time ratio for any two magnifications we only need add to each magnification and square the numbers. Thus, comparing 1½ times with 3 times, we get $(1\frac{1}{2}+1)^2 : (3+1)^2$, or $(\frac{5}{2})^2 : (4)^2$, or $\frac{25}{4} : 16$, or 25 : 64.

Waterproof Paint for the Outside of Wooden Trays.

Brown Varnish, 4 parts; white lead, 2 parts; red lead, 3 parts; seccotine, 1 part. Apply three coats, letting each one dry thoroughly before the next is applied.

Table of Distances between Lens, Negative, and Paper.

Focal Length of Lens.	Linear Magnification.						
	2	3	4	5	6	7	8
4	12 6	16 5¼	20 5	24 4⅘	28 4⅔	32 4⁴⁄₇	36 4¼
4½	13½ 6¾	18 6	22½ 5⅝	27 5⅖	31½ 5¼	36 5⅐	40½ 5
5	15 7½	20 6⅔	25 6¼	30 6	35 5⅚	40 5⁵⁄₇	45 5⅝
5½	16½ 8¼	22 7⅓	27½ 6⅞	33 6⅔	38½ 6½	44 6²⁄₇	49½ 6⅕
6	18 9	24 8	30 7½	36 7⅕	42 7	48 6⁶⁄₇	54 6¾
6½	19½ 9¾	26 8⅔	32½ 8⅛	39 7⅘	45½ 7⁷⁄₁₂	52 7³⁄₇	58½ 7⅝
7	21 10½	28 9⅓	35 8¾	42 8⅖	49 8⅙	56 8	63 7⅞
7½	22½ 11¼	30 10	37½ 9⅜	45 9	52½ 8¾	60 8⁴⁄₇	67½ 8½

Focal Length of Lens is given in the left vertical column. For lenses of longer focus than 7½, *e.g.*, say 10 inches—find the numbers for half this length, viz., 5 inches, and then take the doubles of the corresponding numbers for a 10-inch lens. If we were using a 12-inch lens, we should merely double 30 and 7½ and so get 60 and 15 as the required distances, for 4 times magnification.

Linear Magnification means the number of times a side of the negative is enlarged. Thus a 5 × 4 negative enlarged to 15 × 12 is a linear magnification of 3 times.

To find the distances of the lens from the negative and paper when using, let us suppose a 6-inch lens with a magnification, of say, 4 times linear.

When the 6-inch horizontal and the 4 times vertical column meet, we read two numbers, viz., 30 and 7½. The larger number, 30 inches, is the distance between the lens and enlargement, and the smaller number 7½, is the distance between the lens and the negative.

These numbers are arrived at in the following way. Add to the magnification 4, or total 5. Multiply this by the focal length, viz., 6, yielding 30, the distance between lens and enlargement. Then divide the distance 30 by the magnification number 4, and we get 7½, or distance of lens from negative.

A comparison of the size of the face, in Figs. 17 and 18, will show that the scale or linear enlargement is about 3 times, usually written thus, ³⁄₁.

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